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AMERICAN ANTIQUITY

VOL. V OCTOBER, 1939 NO. 2

EDITORIALS

DIVERSE INTERESTS. Our Vice-President has hit upon a particularly happy note in the editorial published in this number. The Society for American Archaeology is fortunate in having members from so many professions. Much of the strength of the Society may come from this very diversity of interests. It is a pleasure to present our Vice President, Mr. Glenn A. Black of the Indiana Historical Society.

ONE has only to glance through the back numbers of AMERICAN ANTIQUITY, or the tables of contents of recent archaeological reports, to be impressed by the many avenues of approach now being traveled by the professional archaeologist in his search for truth. Practically all sciences, some not even remotely related to archaeology, are being solicited for assistance.

Who would have dreamed, at the turn of the century, that an astronomer would make a momentous contribution to prehistory? Who would have dreamed, a few years ago, that sun dried-brick could be made to divulge the secret of the flora of long ago, that clays of a site could be made to indicate which wares were indigenous and which were not, or that the microscope could show not only that certain copper pieces were heat treated but also the degree of heat applied for successful working? In the field of each professional archaeologist there are "acres of diamonds" waiting to be mined.

Happily, the membership of the Society for American Archaeology is made up not only of specialists in the field of prehistory but of men and women whose interest in the subject takes the form of an avocation rather than a vocation. They might be called amateurs, yet many are distinguished in their own field.

In archaeology there is great need for the sympathetic ear of the geologist, soil expert, chemist, botanist, zoölogist, and metallurgist, to mention only a few, all of whom can be found in every state. It has been the writer's experience that full co-operation from all may be expected even though they may not be specifically interested in our problem. To

the chemist I must be a tyro of the first order when I go to him with my chemical problem. We cannot all be chemists; neither can we all be professional archaeologists. Members of the Society are bonded together with a common interest—prehistory. Through this common interest, collective attack upon our problem becomes possible. Through the medium of AMERICAN ANTIQUITY and the Notebook the results of various methods, techniques and approaches become common property.

This organization is unique, I believe, in so much as it provides the non-professional with the firm foundation of scientific professionalism necessary to raise the level of his efforts above amateurism. The non-professional, in turn, may provide the professional with ideas, methods and solutions that often originate outside the bounds of specialization. I sincerely appreciate the privilege of being Vice-President of an organization in which the members have such a rare opportunity to profit mutually from their association.

Glenn A. Black

NEUTRALITY. Since the last number of AMERICAN ANTIQUITY appeared, the dreaded war has burst forth in Europe. Fortunately we are removed from that conflict by thousands of miles. How long we are able to keep out of it depends in large part on the degree of neutrality exhibited by us all. Our thoughts cannot be neutral, but our acts, and even our speech can be made utterly neutral if we but make the effort.

Among us there are persons with names which may indicate that they or their ancestors were born in one of the belligerent countries. It is well to remember that names and allegiance, or even sympathy, do not always go hand in hand. Let us remember to judge our fellows, scientists as well as laymen, by their acts and not by their names, as was done in the years from 1914 to 1919.

ESKIMO SITES OF THE DORSET CULTURE IN NEWFOUNDLAND[104]

W. J. WINTEMBERG[105]

INTRODUCTION

THE MATERIAL described in this article was secured by Dr. D. Jenness and the writer in 1927 and 1929 in the course of archaeological reconnaissances along the east and west coasts of Newfoundland. The purpose of both field trips was to locate sites and burial places of the extinct Beothuk Indians. Although the writer suspected that other people besides the Beothuk had inhabited the island in prehistoric times,[106] he was surprised to find abundant evidences of the presence of an Eskimo people on the northwest coast: one of the sites visited by Dr. Jenness on the northeast coast also was inhabited by Eskimo.

Most early writers on the aborigines of Newfoundland have unhesitatingly ascribed all archaeological material found in the island to the Beothuk, the only one to dissent from this view being Lloyd.[107] Howley also admits the possibility that some artifacts he describes from Port au Choix are of Eskimo rather than Beothuk origin.[108] As pointed out by the present writer in several places in this article, certain other artifacts illustrated by Howley were also undoubtedly made by Eskimo.

Acknowledgments

The writer is indebted to Dr. Jenness for permission to include descriptions of the artifacts collected by him on the northeast coast. He wishes also to record here his indebtedness to Dr. Frederica de Laguna for permission to use her notes on certain artifacts from Newfoundland in the Peabody Museum, Cambridge, Mass. He is also indebted to Messrs. A. S. Darby of Old Port au Choix, and Bertram Taylor and George Whelin, of Cow Head, for kindly presenting specimens.

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[104] This is the first instalment of this article; another will appear in a subsequent number of this series. The editor regrets that limitations of space make it impossible to print the bibliography at this time.

[105] Associate Archaeologist, National Museum of Canada.

[106] Strong, 1930, p. 134.

[107] In one of his articles (1875, p. 36) he says: "Caution should, I think, be used in attributing all the relics to the 'Beothucs,' because some of them may have belonged originally to the Micmac Indians, and perhaps also to the mountaineers and Esquimos of Labrador, with whom it appears they were in communication." The Micmac, however, did not come to Newfoundland until the eighteenth century, when they had probably discontinued using stone tools.

[108] Howley, 1915, p. 330.

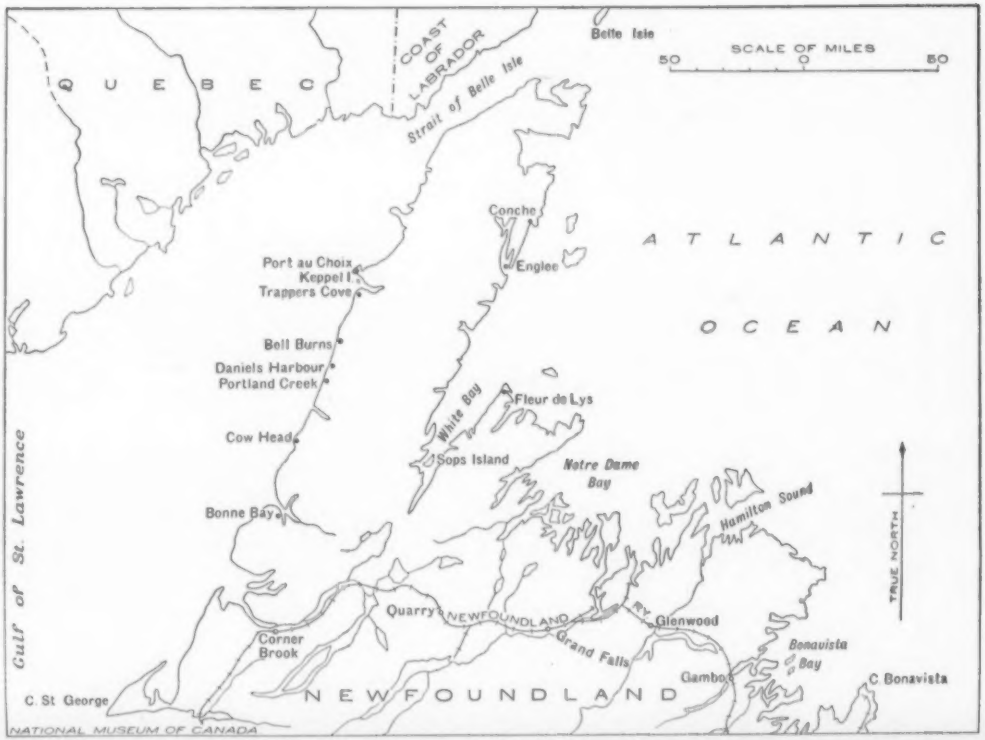

FIG. 3.—Northern Peninsula of Newfoundland showing sites of Eskimo remains.

LOCATION AND DESCRIPTION OF SITES

The sites where most of the specimens described in this article were found are scattered along the northwest coast from Port au Choix to Bonne Bay. It is probable that a more intensive search would reveal many other sites.

In addition to those described below there are sites on the northeast coast, including one on Sops Island, White Bay,[109] one at Englee, Canada Harbor, and another at Conche,[110] all of which were certainly inhabited by Eskimo, judging from the character of the material found.

Excavations were made on only two sites, Portland Creek and Cow Head; they yielded very little more than was obtained on the surface. The Cow Head site has been known for many years, and from its surface considerable material is said to have been collected by local residents and others. At least four other sites seem sufficiently extensive to repay systematic investigation.

All these sites must have been abandoned before the arrival of Europeans, because no objects of white origin were found. It is generally believed that the Basques[111] carried on their whale fishery in the Gulf of St. Lawrence long before Cartier's first voyage, so the sites must have been abandoned before even they appeared, i.e., before 1500 A.D.

Port au Choix

What seems to be an extensive site is located on a flat area about five acres in extent, locally known as Phillips' Gardens, on the north

[109] Lloyd, 1876*b*, p. 234.

[110] Of which Lloyd (*Ibid.*, pp. 234–255) writes as follows: "A fisherman, named Flynn, who owns the ground at that spot, informed me that whilst clearing away the turf for a potato garden, he came upon what he supposed were the remains of a burial ground. As well as he could remember, the following appearances presented themselves. Below the surface of the turf, at a depth of about 18 inches, there occurred in descending order:

1. A layer of yellow clay;
2. A layer of charcoal and ashes;
3. Slabs of large and small stones;
4. Human skeletons arranged in *natural* position, the bones of which crumbled to pieces on being touched. With them were mixed bones of seals and whales. The deposit of bones extended over the whole area of the garden, and may have continued beyond it; he also found measures [?], stone pots, 'drinking cups' of stone, some whole and others in fragments, and a stone 'knife,' about 18 inches long."

[111] "The Spanish Basque fishermen frequented the northwest coast, and their port was Portachua, now called Old Port au Choix." La Hontan, New Voyages to America, edited by R. G. Thwaites, vol. I, p. 308, *note*.

shore of Cape Rich, about one-half mile west of Port au Choix. This site must be exceedingly rich in material, judging from the quantity found while making a few small test holes at the northern end. The deposit consists of very black soil about 6 inches deep, and rests on top of flat limestone rocks. Forty-three artifacts of bone and stone were found, besides an abundance of chippings and bones of food animals, including beaver, bear, otter, whale, probably two different species of seal, and several bird bones, some of which are those of the Canada goose.

About one-fourth mile to the east of this place many chippings of quartz and chert are to be seen on the roadway which crosses a ridge near the home of Mr. James Billard, who has picked up arrow and lance points here and in his garden north of the road.

On his property in Old Port au Choix, about one mile east of Billard's, Mr. A. S. Darby found a few artifacts, including a long stone adz and a fragment of a crude sandstone lamp, both of which he presented to the National Museum of Canada.

About 1904 some human remains, and bone and ivory artifacts, were found on the point at the west side of the bay, north of the village of Old Port au Choix.[112]

Keppel Island

The writer discovered a site on what is locally known as Codtail Point, which forms the eastern end of Keppel Island, Ingornachoix Bay, about one-half mile south of Port Saunders. It covers a roughly triangular area about 700 feet long, east and west, and about 300 feet wide, north and south.[113] About half a dozen small, low circular piles of rough rocks, about 6 feet in diameter, scattered over the point, are probably house ruins. On removing the rocks and digging down to a depth of about 8 inches, arrowheads and other artifacts were found. A few small circular hollows, about 8 feet in diameter and a foot or more deep, may be the remains of other houses. A peculiar feature of the site is the presence of a long, straight row of boulders, 10 to 14 inches in diameter, which extends for several hundred feet east and west along a more or less level area on the north side of the point, about 30 feet from the shore. Although the stones are close together and deeply imbedded in the ground, it is probable that they were used as "hopping

[112] *See* Howley's description, pp. 328–330. Most of them, purchased from a Mr. Billard, by Dr. A. V. Kidder, are in the Peabody Museum, Cambridge, Mass.

[113] The distances given are approximate; no measurements were made.

stones" (*nängissat*),[114] which occur at several Eskimo sites in Greenland;[115] others were found by Collins on St. Lawrence Island, Bering Straits.[116] Besides the artifacts and chippings, bones of the following food animals were found, caribou, beaver, bear, seal and undetermined species of birds.

Trapper Cove

Near Trapper Cove, on the mainland south of Keppel Island, the writer found a triangular arrowpoint. A few others were found at the same place by fishermen.

Bell Burns

In making a roadway in 1929 some workmen uncovered about fifteen chipped stone arrow points and a large fragment of a steatite pot or lamp. The writer visited the site a few days after its discovery and found that it covered an area about 200 by 50 feet on top of the limestone cliffs. The best part of the site is said to be in a garden, which was in crop at the time of the writer's visit.

Daniels Harbor

A few chert chips and artifacts discovered by the writer at Daniels Harbor attest the presence of a small site. Most of it, however, is covered by buildings.

Portland Creek

This site, which is approximately 140 by 50 feet in extent, is located on the north side of the entrance to Portland Creek, which lies about five miles south of Daniels Harbor. A few hundred feet west is a high rocky bluff which afforded some protection against west winds. Local residents claim that about 2 feet of sand has been blown off the site since the soil was first disturbed by the trail crossing it; and it certainly seems to have been exposed to the winds for a long time, as all the bone artifacts, if there ever were any, had completely disappeared. Judging from the small quantity of material discovered, however, it had not

[114] Kleinschmidt, in his dictionary of the Greenland Eskimo dialect, describes these *nängissat* as "big stones, found in various places lying on level ground with considerable intermediate space. They are ascribed by tradition to the old Icelanders, who are said to have placed them for leaping on them on one leg right through the whole row" (translated by Porsild, 1920, p. 297).

[115] *See* Porsild, 1920, figs. 1–4; and Mathiassen, 1934, figs. 3, 25 (plan), and 27, 1936*a*, fig. 12, and 1936*b*, Pl. 2 (map).

[116] *See* Collins, 1937, pp. 26, 354–355.

been inhabited over any long period. Local residents seem to have been unaware of its existence.[117]

A human skeleton found on the shore of the creek a few feet east of the site is considered to be that of a white man.[118]

Cow Head

The site here has been known since about 1900 and considered a Beothuk site. The "Head" is connected to the mainland by a long narrow neck of land. All across this neck the wind has blown away 2 to 5 feet of soil, exposing many chipping places and also what were probably fire-places, although no ashes were observed. Most of the houses seem to have stood on the neck and the west end, which enabled the inhabitants to see enemies approaching from two directions.[119] The specimens seemed most numerous on little eminences, about 3 yards in diameter, which may have been the sites of dwellings. In one place on the neck there was a black, blubber-soaked deposit in which was found a fragment of a steatite object. Some of the old fire-places contained chippings of stone, a few mammal bones (including those of caribou, beaver, and a species of seal), a few bird bones, and shells of *Pecten grandis*, *Mya arenaria*, and *Modiola modiolus*.[120] The presence of chert in the limestone rocks near this site made this the most important aboriginal manufacturing center along the entire coast.

Part of a human skull was found near the east end of the long neck of land that connects Cow Head to the mainland, but it is not known what became of it.

Norris Point

There is a site on a point west of the village of Norris Point, on the north side of Bonne Bay. Here the writer found a few chippings and artifacts chipped from stone. The entire point seems to be covered with the debris of manufacture. The soil in which the artifacts are found is of a whitish color, like ashes in appearance, and was only six inches deep in the spots selected for examination; it lies on top of limestone rocks.

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[117] Only one person previous to the writer is known to have found an arrowhead in passing along the trail. [118] Said to be in the Museum at St. Johns.

[119] It resembles an Eskimo site on Button Point, Bylot Island, Baffin Island, in being connected with the mainland by a narrow neck of land (*see* Mathiassen, 1927, I, fig. 66). According to Cartwright, the Beothuk followed the custom of erecting their habitations on similar necks. He says: "Their wigwams are frequently erected on a narrow isthmus; so that their canoes may be launched into the water on the safe side, whenever an enemy's boat appears" (quoted by Howley, 1915, p. 36).

[120] Identification confirmed by A. LaRocque, Geological Survey, Canada.

James L. Humber of Norris Point told the writer that he had found on his property north of the point many arrow heads, spear heads, and knife points chipped from stone, and half of a large steatite dish.

Bonne Bay

The writer found an arrow point, and a few fragments of what seem to have been leaf-shaped blades chipped from chert, on what is known as Lighthouse Point, at the north end of the village of Bonne Bay. Stone artifacts have been found in practically every garden in the village. Mr. John W. Roberts' grandfather found, in a field a few hundred feet south of Lighthouse Point, many arrow points, spear points, stone adzes, stone gouges, and the half of an oval steatite dish. The presence of the stone gouges, however, suggests that the site was not that of an Eskimo people. Arrow heads have also been found on what is locally known as Mudge Point, north of the village.

Englee, Canada Harbor

Jenness recovered a number of stone implements from the surface of a potato patch at the eastern end of this village, a few yards back from the sea. Houses seemed to cover the greater part of the site.

THE ARTIFACTS

The specimens recovered from the sites just listed are made of stone, bone, antler, or ivory, but the majority are of stone, whereas in Eskimo sites in the Arctic, artifacts of bone and other animal materials outnumber those of stone at least five times. In a few cases the paucity of artifacts derived from animal materials is evidently due to their disappearance through long exposure to the sun and weather. The fact, also, that the ground is not permanently frozen in Newfoundland, as in the Arctic, may account for the disappearance of some of the bone artifacts, as it certainly does for those of wood.

Stone Artifacts

Most of the stone artifacts are chipped into shape; others are smoothed and polished. Only one unfinished specimen reveals signs of pecking on its edges; its faces show no evidence of this process.

Chipped Stone Artifacts

In the four hundred and forty-five artifacts of chipped stone, there are thin lamellar flakes, leaf-shaped forms, arrow points, lance points,

knives, scrapers, a drill point, a chisel-like object, and a few implements of uncertain use.

Besides the completed artifacts there was present at most of the sites such rejectage of manufacture as chippings, large chunks of material from which pieces had been broken and others that seem to be prepared cores, unfinished artifacts, and fragments of finished ones. About eight hundred chips of chert, jasper, chalcedony, quartz, quartz crystal, and quartzite were found, the majority being of chert. Only fifty-nine show secondary chipping. One, of rough chert (Cat. No. VIII-A-180*g*), is considerably worn from use on one edge, or it may have been purposely ground.

Flake knives. There are one hundred and forty thin lamellar flakes; seventy-five are of chert, six of jasper, thirty-four of chalcedony (see Plate VI, Figure 2, Numbers 1 and 2), and twenty-five of quartz crystal. They all retain the original plane of fracture on the lower or concave face. Some are plano-convex, others trapezoidal in cross-section; still a few others show five longitudinal flutings. The majority are curved from end to end, and in many cases have parallel edges. Twenty-two have the edges retouched, others have been chipped until one face is convex; these, however, may have been flakes from prepared cores. One of these, of bluish grey chert, roughly triangular in cross-section and 3/16 inch thick, is seen in Plate VI, Figure 2, Number 3. A few have one of the tips retouched, for what purpose is not apparent; another is chipped to an oblique sharp edge at one end. They vary from $\frac{3}{4}$ inch to $2\frac{1}{2}$ inches long, 3/16 to $\frac{5}{8}$ inch wide, and 3/32 to 3/16 inch thick. There are only a few parent cores from which such flakes were detached (Cat. Nos. VIII-A-181*a* and VIII-A-187*a*, *f*, *h*, *j*).

The straight edges of many flakes are sufficiently sharp to cut soft wood. Hence the majority were probably used as knives to shape objects of bone, antler, and wood. Only four, however, show any signs of use on the edges.

Flakes were found at all the sites except those at Trapper Cove, Daniels Harbor, and Lighthouse Point, Bonne Bay. The largest number (seventy-eight) came from the Portland Creek site. The writer has not seen similar flakes from sites anywhere along the Atlantic coast, or in the interior of Nova Scotia, New Brunswick, and Quebec, and he knows of only one from Ontario.[121] They occur, however, in mound culture

[121] This is a somewhat leaf-shaped flake, triangular in cross-section, $1\frac{3}{4}$ inches long, $\frac{1}{2}$ inch wide, and $\frac{1}{8}$ thick, from lot 45, con. I, Vaughan Township, York County. One of the edges has been retouched or was chipped from use.

sites in Ohio,[122] in Kanawha valley, West Virginia,[123] and in Union County, Mississippi.[124]

Leaf-shaped blades. Fifty-five oval and leaf-shaped blades were found, four at Portland Creek, five at Englee, one at Norris Point, and the remainder at Cow Head. In addition to the whole specimens there are forty-six fragments, most of which also come from Cow Head. The majority are of chert, but a few are of chalcedony or quartzite, one quartzite specimen being derived from a spall that still retains the waterworn surface of the pebble on one face (Cat. No. VIII-A-386*a*). Another, chipped from reddish quartzite, is battered on the smaller end as if it had been used as a hammer (Cat. No. VIII-A-389). A few blades chipped from chert slabs also retain the waterworn surface. About half of the blades are roughly oval in outline (Plate VI, Figure 1, Number 10); a few are almost round (Cat. Nos. VIII-A-382*a* and VIII-A-385*m*). Some of the leaf-shaped blades are pointed at both ends (Plate VI, Figure 1, Numbers 4, 12); one, shown in Plate VI, Figure 2, Number 16, resembles some blades from Eskimo sites in Greenland[125] and in the central[126] and western Arctic.[127] Others have straight bases (Plate VI, Figure 1, Numbers 5, 11); a few have rounded bases (Plate VI, Figure 1, Number 9); and one has a slightly indented base (Plate VI, Figure 1, Number 3). A few of the double-pointed blades are almost lozenge-shaped. Some are roughly lenticular in section from side to side and end to end. Two blades have a large lump on one face, making them asymmetric as viewed from the side; and another is curved from end to end (Cat. No. VIII-A-394). The blade illustrated in Plate VI, Figure 1, Number 3, is like some of the triangular points described below in having part of one face ridged from the tip to about the middle of the blade.

With the exception of a few small specimens they are crudely chipped. In length they vary from 1 3/16 to 5½ inches, but the majority are between 2⅜ and 3 3/16 inches. In width they range from ⅞ inch to 3¼ inches; and in thickness from ¼ inch to 1⅜ inches, most of them being between ⅜ and ⅞ inches.

Besides the complete blades there are several tip, base and middle fragments, only two of which require mention. One, from Cow Head,

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[122] *See* Mills, 1907, fig. 63, and, 1921, fig. 21; Moorehead, 1910, I, fig. 26; Hooton and Willoughby, 1920*a*, Pl. V, fig. *b*, and, 1920*b*, fig. 10*a*; and Shetrone, 1926, figs. 25 and 28.

[123] *See* Fowke, 1892, p. 174 [124] *Ibid.* [125] *See* Mathiassen, 1930*b*, fig. 39, *5*.

[126] Mathiassen, 1927, I, Pl. 19, fig. 1. [127] *See* de Laguna, 1934, Pl. 30, fig. 23.

a basal fragment of a blade of grey chert (Cat. No. VIII-A-367), lenticular in cross-section and $\frac{1}{4}$ inch thick, differs from the rest of the large blades in having straight sides and base. The other (Cat. No. VIII-A-294*f*), from Portland Creek, also a basal fragment with lenticular cross-section, but of veined bluish-grey chert, has both edges regularly and evenly chipped and the base indented.

Most of the blades probably are either unfinished or else rejects, which it was impossible to reduce to symmetrical forms, owing to stubborness of the material or to their being spoilt by a misdirected blow early in the process of chipping.

The blades with sharp edges probably were used as knives, although the edges do not present evidence of such a use. The shape of the one seen in Plate VI, Figure 1, Number 7, with one edge more curved than the other, suggests that it was a knife, although it may have been considered too thick for the purpose. A circular blade of grey chert from the Cow Head site (Cat. No. VIII-A-384*o*) has the upper half roughly chipped and the lower half brought to a sharp convex edge; it was probably used as a knife or scraper.

Triangular arrow points. One hundred and thirty-eight triangular points were found—ten at Port au Choix, nineteen on Keppel Island, one at Trapper Cove, fifteen at Bell Burns, one at Daniels Harbor, fifty-nine at Portland Creek, five at Cow Head, and twenty-eight at Englee, Canada Harbor. Seventy-four are incomplete, having either the tip, or one or both corners of the base missing. The majority are of chert; the rest of jasper, chalcedony, and quartz. One of the unfinished points appears to be derived from a thin lamellar flake with a trapezoidal cross-section. Nearly all are beautifully chipped (Plate VI, Figure 2, Numbers 5–9), although a few are quite crude.

They vary from $\frac{1}{2}$ inch to $1\frac{7}{8}$ inches in length, 7/16 inch to 1 inch in width, and from $\frac{1}{8}$ inch to $\frac{3}{8}$ inch in thickness. Only a few are very small.

Ninety-four points have convex edges, seven with straight bases (Plate VI, Figure 2, Number 6), two with convex, and eighty with concave (Plate VI, Figure 2, Numbers 5, 7–11). Thirty-seven other points have straight edges, five with straight, two with convex, and twenty-two with concave bases. The basal concavity is shallow on most of the points. A few points are asymmetrical, with oblique bases; others are curved from end to end. One is unusual in having lateral notches about $\frac{3}{8}$ inch from the tip (Plate VI, Figure 2, Number 13). Five others have the sides near the base incurved, and this, with the deep basal concavity, has transformed the corners into long, slender barbs, which in a few

cases curve slightly outward.[128] The tips of the barbs on one point are squared off, in which respect they resemble those on some triangular points from County Derry, Ireland.[129] One point, with a delicate tapering tip, has the sides and base deeply concaved (Plate VI, Figure 2, Number 29). Only four of the points show minute and very carefully chipped serrations like those on points from Cape Dorset.

Thirty-two points retain all or part of the original plane of fracture on one face, in some cases with only the extreme tip or the basal edge retouched. The opposite face is mostly evenly chipped and convex from side to side, making the points plano-convex in cross-section. Only eighteen points are trimmed on both faces, most of them with a lenticular cross-section; but even a few of these have one face more convex than the other.

Seventy-one, or more than one-half the points, are ridged or carinated on one face, giving a faceted appearance. The ridge extends almost from tip to base on a few specimens, but in most cases for only about one-third of the length (Plate VI, Figure 2, Number 11), making this part of the point mixtilinear-triangular in cross-section. The fact that there are so many points of this kind suggests that the retention of the ridge was not accidental, but that pains were taken to select ridged chips from which to make the points (see Plate VI, Figure 1, Number 1). There is very little retouching along the sides of the ridged face of these points; what little chipping there is, is at the tip and on the base. The opposite face is evenly chipped to a convex surface. They were found in the sites at Port au Choix, Keppel Island, Bell Burns, and Cow Head.

These ridged points are like some of the faceted blades of ground and polished slate found in "Dorset"[130] and other Eskimo sites.[131] Although none was obtained by the writer, polished slate faceted points of the same size as these chipped points have been found in Newfoundland.[132] It might be noted that in addition to their faceting these chipped points have nearly the same shape as some of the polished slate blades from Eskimo sites generally, although the bases of the latter on many specimens are not concave but straight.[133]

[128] Compare with similar barbs on a point from near Poplar Bluff, Mo., illustrated by Moorehead, 1910, I, fig. 56.

[129] *See* Wilson, 1899, Pl. 38, figs. 24, 25.

[130] *See* Jenness, 1925, fig. 4*b*.

[131] *See* Mathiassen, 1927, I, Pl. 7, figs. 2, 6, 8, Pl. 63, fig. 2, and Pl. 65, figs. 28–30; and Thomsen, 1917, Pl. XII, figs, 4, 6, 8, 10, 12, 13, and Pl. XIV, figs. 3, 5, 10, 11.

[132] *See* Howley, 1915, Pl. XXI, figs, 33, 34; the localities are not given.

[133] Even some bone harpoon points (*See* Jenness, 1925, fig. 8*a*, *g*, and Mathiassen,

Triangular points of the same kind as those from coastal sites of northwestern Newfoundland are illustrated by Howley, and probably are from Eskimo rather than Beothuk sites.[134] Lloyd illustrates four specimens of the same type from either Sops Island, at the head of White Bay, or (most likely) Conche Harbor on the northeast coast, north of Canada Harbor.[135] Twenty-five specimens in the Peabody Museum, Cambridge, Massachusetts, were collected by Owen Bryant at Oil Island,[136] Roberts' Arm,[137] and Sunday Cove Island,[138] Notre Dame Bay. The writer did not find any points of the same kind at Eskimo sites near Bradore, Blanc Sablon, and Longue Pointe, on the north shore of the Strait of Belle Isle. Strong found one near Hopedale on the east coast of Labrador.[139] They have also been found at Stupart[140] and Wakeham bays[141] on the north coast, at Eevooyik, south of Cape Wolstenholme,[142] Mansfield Island,[143] Hopewell Sound,[144] and Port Harrison,[145] on the northwest coast of the Labrador peninsula; on one of the Belcher Islands,[146] on the east side of Hudson Bay; at Cape Dorset,[147] and in northern Baffin Island;[148] but very few have been reported from Eskimo sites west of Hudson Bay.[149] Similar points are rarely found in

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1927, I, Pl. 2, fig. 6, and Pl. 65, figs. 2, 4) and some long antler deer arrows figured by Mathiassen (*Ibid.*, Pl. 8, figs. 5, 6, and Pl. 10, fig. 3) have the tips similarly carinated or faceted.

[134] Howley, 1915, Pl. XXI, figs. 8–12, 19–26, 28–31, 37–39, 41, 45, 46.

[135] Lloyd, 1876*b*, Pl. XI, figs. 9–12.

[136] Cat. No. 66420 (three specimens).

[137] Cat. No. 66445 (thirteen specimens).

[138] Cat. Nos. 66408 (one specimen) and 66409 (five specimens).

[139] *See* Strong, 1930, Pl. 6. fig. *o*.

[140] A crude specimen, lenticular in cross-section, chipped from dark grey quartzite, and a plano-convex specimen chipped from dark grey material, were both collected here by F. Johanssen in 1927 (Cat. Nos. IX-B-44 and IX-B-45, National Museum Canada).

[141] One chipped from white quartz collected by F. Johanssen in 1927 (Cat. No. IX-B-51).

[142] One with concave base, chipped from chert, and a broad one with convex edges and straight base, chipped from chalcedony, collected by H. C. Gunning in 1933 (Cat. Nos. IX-B-57 and IX-B-58).

[143] A finely chipped specimen with deeply concave base (Cat. No. IX-C-2375).

[144] Two small specimens chipped from quartz and another $\frac{3}{4}$ inch long and 7/16 inch wide, chipped from grey chert, collected from the surface of an ancient camp site by A. P. Low in 1902 (Cat. Nos. IX-B-9 to IX-B-11).

[145] *See* Mathiassen, 1927, I, Pl. 77, fig. 5.

[146] *Ibid.*, Pl. 77, figs. 16, 17.

[147] *See* Jenness, 1925, fig. 4*f*, *g*. Smaller ones than those illustrated are Cat. Nos. IX-C-2179, IX-C-2180, and IX-C-2183. They are not so wide across the base as some of the points from Coats Island.

[148] *See* Mathiassen, 1927, I, Pl. 61, figs. 7–9, showing specimens from Button Point, Bylot Island.

[149] From Alaska (Cat. No. IX-F-3136*b*).

eastern Canada and the United States;[150] most of the triangular points from Algonkian or Woodland sites in Ontario, for example, are broader and more like an equilateral triangle in outline than any of the "Dorset" points; the very few that are of the same shape as most of the "Dorset" points, that is, with convex sides and deeply concaved base, are not plano-convex and none that the writer has seen are carinated.

Twelve of the triangular points mentioned above in the Peabody Museum, from sites on Notre Dame Bay, Newfoundland, are carinated on one face,[151] and there are even four laterally notched points with the same feature.[152] The writer knows of only one other point of this kind from an Eskimo site elsewhere in the eastern Arctic,[153] although Thomsen illustrates a few from Greenland, some of which, however, appear to have been ground into shape.[154]

Stemmed lance or knife point. The stemmed and shouldered lance or knife point seen in Plate VI, Figure 2, Number 12, is the only one of this type known to come from an Eskimo site in Newfoundland. It is about 5/16 inch thick and differs from most points of the same type in having the convex edges of the stem converge to a point at the base.

There are similar points from Eskimo sites elsewhere in the Arctic,[155] and they have been found in what are probably Woodland sites in Ontario,[156] Quebec,[157] New York,[158] New England,[159] and in sites of what

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[150] According to Wilson (1899, p. 910) triangular points "appear in greater numbers on the Atlantic coast than in the interior. Dr. Abbott says that in a series of 3300 arrow-points from Mercer county, New Jersey, 1428 were triangular." In his Pl. 32, figs. 7, 13, 14, he shows specimens from Connecticut and Georgia, which are almost like some of the Eskimo specimens here described.

[151] Three from Oil Island (Cat. No. 66420), five from Roberts' Arm (Cat. No. 66445), and four from Sunday Cove Island (Cat. No. 66409).

[152] Three from Oil Island (Cat. No. 66420) and one from Sunday Cove Island.

[153] One of about the same size as some of those described, chipped from chert, was found by A. P. Low in 1902 in an ancient camp site on Hopewell Sound, east coast of Hudson Bay (Cat. No. IX-B-8).

[154] *See* Thomsen, 1917, Pl. XII, figs. 2, 4, 5, 6, 8, 11, Pl. XIV, figs. 1–5, and especially figs. 9 and 10.

[155] *See* Mathiassen, 1933, fig. 30, *1*, also Pl. 3, fig. 3, showing one from Greenland, and Mathiassen, 1930*a*, Pl. 15, fig. 9, one from Alaska. There is a specimen from Hopewell Sound, west coast of Labrador, Collected by A. P. Low, in 1902, in the National Museum of Canada (Cat. No. IX-B-6), but the shoulders are more rounded than those on the specimen illustrated.

[156] From the counties of Elgin and Norfolk (Cat. Nos. VIII-F-291, VIII-F-649, VIII-F-932, VIII-F-4059, VIII-F-4166, VIII-F-5247, VIII-F-5514, and VIII-F-7434).

[157] A slightly shouldered one was collected by the writer near Tadoussac, Saguenay County (Cat. No. VIII-E-604*b*).

may be other cultures in other parts of the United States,[160] but they are mostly broader than the one illustrated.

Notched arrow, lance, or knife points. Notched points for arrows, lances, or knives were less common than the triangular and leaf-shaped forms. Two are from Keppel Island, one from Bell Burns, eight from Portland Creek, two from Cow Head, one from Norris Point, one from Lighthouse Point, Bonne Bay, and nine from Englee.

All these points bear lateral notches;[161] and this is also the case with other notched points from Eskimo sites in the eastern Arctic.[162] None of them has barbs formed by deep diagonal notches; in fact, points of that type are not known from Eskimo sites.[163]

The point in Plate VI, Figure 2, Number 40, both edges of which are fairly sharp, was probably intended for use as a knife; for one edge is more curved than the other. There is only one notch and it is on the straighter side of the blade; the base is wedge-shaped. It is $\frac{1}{4}$ inch thick. Two broken points from Englee, chipped from translucent quartz, are also notched on the one edge only. One of them (Cat. No. VIII-A-44) has one edge more curved than the other. Another point from Englee, but with notches on each edge, is plano-convex in cross-section and has the tip chipped to a slightly oblique sharp edge (Plate VI, Figure 2, Number 21). A small, crude point from Bell Burns (Cat. No. VIII-A-262), 1 inch long, 11/16 wide, and $\frac{1}{8}$ inch thick, with shallow notches on each edge, is derived from a chip which was ridged on one face and retains the original plane of fracture on the other face. A point from Englee (Cat. No. VIII-A-73), of the same length as the last, $\frac{3}{8}$ inch wide and $\frac{1}{8}$ inch thick, and with small lateral notches, is derived from a chip of black chert, plano-convex in cross-section. Four points, each about twice as long as wide, lenticular in cross-section and apparently

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[158] *See* Skinner, 1920, Pl. VIII, figs. *a*, *b*, and Parker, 1922, Pl. 4, fig. 3.

[159] Willoughby, 1935, fig. 66*f*.

[160] *See* Wilson, 1899, fig. 162, showing one from Edmondson County, Kentucky; another, from Dane County, Wisconsin, is illustrated by Fowke in his fig. 213.

[161] *See* also Howley, 1915, Pl. XIX, figs. 12, 15, 16, 18, 23, Pl. XXI, figs. 48, 49, 54, 55, 58–62, and Pl. XXII, figs. 33, 34; some of these may be from Eskimo sites.

[162] *See* Mathiassen, 1927, I, Pl. 44, figs. 16, 19, 21, 22, Pl. 61, figs. 1–6, Pl. 63, fig. 3, Pl. 67, fig. 7, Pl. 70, fig. 4, and Pl. 74, figs. 6–8; and Mathiassen, 1930*b*, Pl. 5, fig. 17, and Pl. 8, fig. 1. Most of the lance heads from the Western Eskimo are stemmed and shouldered (*see* Murdoch, 1892, figs. 183–185, 232, 240, 244, and 246, and Mathiassen, 1930*a*, Pl. 7, figs. 16, 17, Pl. 14, figs. 4–6, and Pl. 15, fig. 9).

[163] Howley, however, illustrates some which may be from Eskimo sites (Pl. XXI, figs. 47, 50–52).

derived from triangular points by notching each edge near the base, were probably all used as knife blades. The one in Plate VI, Figure 2, Number 20, chipped from yellow chert, ¼ inch thick, has one side or edge more sloping than the other and an oblique base, with shallow notches and insignificant tangs. A more symmetrical point of nearly the same proportions, but chipped from grey chert (Plate VI, Figure 2, Number 19), has a rounded tip and a slightly indented base. Two other specimens of nearly the same shape, but larger, both neatly chipped from black chert, have deeper lateral notches. The one in Plate VI, Figure 2, Number 41, is ¼ inch thick; the other (Cat. No. VIII-A-312*a*) is 2½ inches long, 1 15/16 inches wide, and 5/16 inch thick. Another kind of point, with long, convex edges and deep lateral notches, chipped from yellowish white chert, is seen in Plate VI, Figure 2, Number 42; it is 5/16 inch thick. A nearly similar point, but only 1⅝ inches long, ¾ inch wide, and 5/32 inch thick, chipped from bluish-grey chert, but with the edges more abruptly bevelled than on other points, comes from the Lighthouse Point site, Bonne Bay (Cat. No. VIII-A-418). A broader point of the same type, but with the tip missing, from Englee (Cat. No. VIII-A-41), measures about 1 inch wide and ¼ inch thick, and is chipped from translucent quartz. A slender point, 3/16 inch thick, with almost straight, partly serrated edges and with small lateral notches collected at the Cow Head site by George Whelin, is seen in Plate VI, Figure 2, Number 22. The point in Plate VI, Figure 2, Number 17, also from Cow Head, is lenticular in cross-section, 9/32 inch thick, most regularly and beautifully chipped from greyish semitransparent chalcedony, and has both long edges minutely serrated. The point in Plate VI, Figure 2, Number 39, with a lenticular cross-section, and ¼ inch thick, chipped from grey chert, is shaped like some of the objects classed as drill points.[164] Another from the same locality, and of the same width and thickness, but with the tip missing (Cat. No. VIII-A-38), is chipped from a greyish chert-like material. The writer has not seen any illustrations of similar long points from Eskimo sites elsewhere, but a few have been found in sites of other cultures in Canada[165] and the United States.[166]

A small, crude chert point from Norris Point (Cat. No. VIII-A-410),

[164] Points with similar broad notches have been found in an Eskimo site in Greenland (*see* Mathiassen, 1933, Fig. 30, *2;* and Solberg, 1907, Pl. 3, figs. 12, 16, 18).

[165] Cat. No. VIII-F-2939, from Malahide Township, Elgin County, Ontario, but much wider across the base.

[166] *See* Ritchie, 1932, Pl. V, fig. 32, and Pl. VI, fig. 16, showing specimens from an archaic Algonkian site near Lamoka, New York.

plano-convex in cross-section, with part of the tip missing, has a peculiarly shaped base, similar to those on certain arrowpoints and spearpoints from Ontario.[167] It is 1¼ inches long, ⅝ inch wide, and 3/16 inch thick. A broad jasper point ¼ inch thick, with convex edges, one of which is more curved than the other, and with the same kind of stem as that on the point just described, is seen in Plate VI, Figure 2, Number 18. It differs from similar broad, convex-edged points from Eskimo sites elsewhere in not having a parallel-sided stem. A fragment of a point, chipped from the same kind of material, and from the same site (Cat. No. VIII-A-311*b*), seems to have been similar. There is also what seems to have been a point of the same type, 1⅛ inches long and ¼ inch thick, from Englee (Cat. No. VIII-A-34); it is chipped from whitish translucent quartz or quartzite.

At Englee was found a short, broad point, probably for a knife, chipped from black chert, with two lateral notches in each edge at the base (Cat. No. VIII-A-42). Two basal fragments are similarly multiple-notched; one of them, chipped from dirty-white quartzite, plano-convex in cross-section, is 3/16 inch thick, with two lateral notches (PlateVI, Figure 2, Number 15); the other, chipped from black chert, somewhat diamond-shaped in cross-section, is ¼ inch thick, with three notches in each edge, the upper one being about ¾ inch above the base (Plate VI, Figure 2, Number 14). The extra notches were evidently intended for more than one ligature; perhaps there was a separate ligature for each notch, making the attachment to the shaft or handle more secure.

Chipped points[168] and polished slate points[169] with more than one notch on each edge are rare in Eskimo sites elsewhere, but they have been found outside of the Eskimo area, although they are by no means common.[170]

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[167] *See* Wintemberg, 1931, Pl. IV, fig. 3.

[168] One, plano-convex in cross-section, 7/32 inch thick, chipped from translucent smoky quartz, with two lateral notches in each edge, was collected by Hawkes in east Labrador (Cat. No. IX-A-25). Howley, 1915, Pl. XIX, fig. 19, illustrates one from Newfoundland, with one notch on one edge and two on the other. There are two chert points with multiple notches from Notre Dame Bay in the Peabody Museum, Cambridge, Mass., one of them with two and the other with three notches on each edge (Cat. Nos. 66420*a* and 66408*l*).

[169] *See* Mathiassen, 1927, I, Pl. 77, fig. 20, showing one from Port Harrison, on the east coast of Hudson Bay. Two specimens, both with two notches in each edge, were collected by A. P. Low, in an ancient camp site on Hopewell Sound (Cat. Nos. IX-B-2 and IX-B-3), and another, with three notches by E. W. Hawkes on Big Island, Baffin Island (Cat. No. IX-B-40).

[170] *See* Wilson, 1899, Pl. 34, fig. 2, showing one from Maine; and Beauchamp, 1897, figs. 42, 119 and 120, showing specimens from New York.

Drills. The tip of a roughly pointed chip of chert (Cat. No. VIII-A-181*n*) is worn from use, probably as a drill. The shape of the arrowpoint in Plate VI, Figure 2, Number 29, suggests that it also may have been used as a drill, although no artifacts with drilled holes were found in any of the sites.

Scrapers. Scrapers were less common than arrowpoints, but about eighty specimens were secured; the largest number (thirty-two) from any one site, came from Portland Creek. Only two specimens are from Englee. They separate into two types: end scrapers and side scrapers.

The end scrapers are derived from suitably shaped chips of various silicious materials; chert, jasper, chalcedony, and quartzite. A few, including the small one in Plate VI, Figure 2, Number 26, are made from long narrow lamellar flakes. Most of them retain the original plane of fracture on the lower face. It is generally the bulbar face that has been chipped into shape, with the scraping edge in most cases abruptly bevelled by steep flaking. Very few are chipped on all sides; the majority are finished only on the cutting edge and sides, and some on the cutting edge only. A few specimens appear to be unfinished. About half are plano-convex; others are concavo-convex; and a few are double-convex and somewhat lenticular in cross-section. The scraping edge, which is occasionally finely serrated, is usually convex, very seldom straight. Only in a few specimens is it dulled from use.

Scrapers vary in length from 9/16 inch to $1\frac{7}{8}$ inches, in width from $\frac{3}{8}$ inch to $1\frac{1}{8}$, and in thickness from $\frac{1}{8}$ to $\frac{5}{8}$ inch; the majority, however, are from $\frac{3}{4}$ inch to 13/16 inch long, $\frac{5}{8}$ to $\frac{3}{4}$ inch wide, and 5/32 to $\frac{1}{4}$ inch thick. A very large, crude specimen from Cow Head (Cat. No. VIII-A-382*z*), is $2\frac{3}{8}$ by 2 5/16 inches in diameter and $\frac{7}{8}$ inch thick. A few are as wide as they are long, and in one or two cases the width exceeds the length.

They can be roughly divided into about eleven different kinds, according to their outlines or special features, viz.: (1) crude, irregularly shaped, (2) roughly circular, (3) ovoid or leaf-shaped, (4) oblong, (5) triangular, (6) squarish, (7) rectangular, (8) trapezoidal, (9) with flaring edges, (10) with incurved sides, and (11) notched.

The first or most simple kind, of which there are only a few specimens, consists of irregularly shaped chips with one or more edges trimmed to a bevel for use (Plate VI, Figure 2, Number 35); one has the edge formed by retouching from both faces. The second, fourth and fifth (Plate VI, Figure 2, Numbers 26 and 30), sixth, and seventh kinds are also few in number, the majority being either ovoid or leaf-shaped (Plate VI, Figure 2, Number 27), or else trapezoidal (the largest of the

trapezoidal forms is seen in Plate VI, Figure 2, Number 25). Only two specimens have a flaring edge (Plate VI, Figure 2, Number 31). Three scrapers, of which one is seen in Plate VI, Figure 2, Number 37, are of the tenth kind, with incurving sides.[171] There are three notched specimens (Plate VI, Figure 2, Numbers 36 and 39); but it is possible that some of them may be abortive attempts to form arrowheads.

Most of these scrapers, even those with the upper end missing, were probably set in handles and used for dressing hides. The very narrow ones in Plate VI, Figure 2, Numbers 26 and 27, may not have been used for that purpose, but for working wood or bone. The notched specimens, and those with incurved sides, were probably hafted in clefts and secured by lashings.

Some of the blades are not unlike scrapers from Woodland (Algonkian) and Iroquoian sites in Ontario. The trapezoidal blades, however, seem to be confined to Eskimo sites in Newfoundland and Greenland.[172]

There are two concave side scrapers (Plate VI, Figure 2, Numbers 33 and 34). The one shown in Number 33 is derived from a chalcedony chip, 3/16 inch thick, which retains the original plane of fracture on one face; part of the upper end seems to be missing. The other (Number 34), 3/16 inch thick, made from a curved lamellar flake of chalcedony, also retains the original plane of fracture on one face. In both specimens one edge is deeply concave, perhaps from long use in scraping wooden, bone, and antler artifacts. The smaller end of the one in Number 34 may have been used for making the rectangular sockets in harpoon points, for which purpose it seems to be admirably adapted.

Three somewhat similar specimens were found by Lloyd at Conche Harbor,[173] and others from Newfoundland are illustrated by Howley,[174] but he does not give the localities where they were found. They are also found in Eskimo sites of the Inugsuk culture in Greenland,[175] on

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[171] *See* Jenness, 1925, fig. 4*h*. Mathiassen, 1927, I, Pl. 44, fig. 21, shows one from Pond's Inlet, Baffin Island, Pl. 67, fig. 7, one from Southampton Island, Hudson Bay; and Mathiassen, 1930*a*, Pl. 15, fig. 10, one, much longer and wider, from Alaska.

[172] *See* Birket-Smith, 1924, fig. 67; and Mathiassen, 1927, I, Pl. 61, fig. 16, and 1933, Pl. 9, figs. 1 and 3, also text fig. 30, 7, *8*.

[173] *See* Lloyd, 1876*b*, Pl. XI, figs. 1–3.

[174] *See* Howley, 1915, Pl. XXII, figs. 1–3.

[175] *See* Mathiassen, 1930*b*, fig. 39, 10 (after Thomsen); 1931–32, Pl. 7, fig. 7; 1933, Pl. 9, fig. 6, and p. 91, on which he says: "This concave-edged scraper is a form that is peculiar to west Greenland, beginning in the Inugsuk Culture, but attaining rich development in the West Greenland Stone Age"; and, 1934, Pl. 9, fig. 13. *See* also, Solberg, 1907, Pl. 2, figs. 1–24.

the west coast of the Labrador Peninsula,[176] and in a site of the Old Bering Sea culture on St. Lawrence Island, Alaska.[177]

The specimens illustrated in Plate VI, Figure 2, Numbers 24 and 32, may also be considered here: the first, $\frac{3}{8}$ inch thick, is one of two with a deep notch in one edge, which may have been used in shaping small wooden and bone objects; the second is a chalcedony chip, about $\frac{1}{8}$ inch thick, with two concave cutting edges on one side, either purposely chipped or produced by constant scraping.

Artifacts of Uncertain Use

The use of some other chipped artifacts is unknown. The specimen from Englee, seen in Plate VI, Figure 2, Number 23, looks as if it was unfinished, but may have been used as a knife or scraper. It is 5/32 inch thick. No similar artifacts were found at any site on the west coast of Newfoundland, but there are a few from Cape Dorset, Baffin Island, in the National Museum.[178] Solberg illustrates specimens from Greenland.[179]

The long slender object of dark grey chert, $\frac{1}{8}$ inch thick, seen in Plate VI, Figure 2, Number 4, has the smaller end retouched to an oblique edge, possibly for use as a graver, although only two objects bear what seems to be engraved decoration that could have been made with such a tool. It may also have been used for cutting the rectangular socket holes in harpoon heads. One of the long sides is slightly chamfered and the edge is somewhat worn by use.

From Cow Head comes a fragment of a sand-eroded object (Cat. No. VIII-A-362*a*), about $1\frac{1}{2}$ inches thick, crudely chipped from maroon quartzite; it has abrasions along both edges which may be due to use as a sinew smoother.

Another sand-eroded object (Plate VI, Figure 1, Number 13), crudely chipped from pinkish quartzite, with the broader end worked to a blunt edge, may be in process of manufacture into an adz.[180] It is 1 11/16 inches thick.

(To be concluded)

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[176] One from an ancient camp site on Hopewell Sound, collected by A. P. Low in 1902 (Cat. No. IX-B-22).

[177] *See* Collins, 1937, Pl. 41, figs. 22, 23.

[178] Several specimens included under Cat. No. IX-C-412.

[179] *See* Pl. 3, figs. 7 and 8.

[180] de Laguna shows a somewhat similar specimen in her Pl. 20, fig. 1, from Halibut Cove, Cook Inlet, Alaska, which she classes as a planing adz.

PLATE VI
Chipped Artifacts
(All one-fourth natural size)

FIGURE 1

1. Unfinished triangular chert point, ridged on one face. From Portland Creek. Cat. No. VIII-A-293*a*.
2. Broad triangular chert blade. From Port au Choix. Cat. No. VIII-A-194.
3, 4. Chert blades. From Portland Creek. Cat. No. VIII-A-309 and Cat. No. VIII-A-296*f*.
5. Leaf-shaped quartz blade. From Englee. Cat. No. VIII-A-30.
6, 7. Thick chert forms. From Cow Head. Cat. No. VIII-A-383*q* and Cat. No. VIII-A-348.
8. Unfinished object of grey slate. From Cow Head. Cat. No. VIII-A-361.
9, 10, 11. All of chert. From Cow Head. Cat. No. VIII-A-386*b*, Cat. No. VIII-A-385*r*, and Cat. No. VIII-A-382*u*.
12. Broken semilunar chert form. From Cow Head. Cat. No. VIII-A-384*p*.
13. Large unfinished object of pinkish quartzite. From Cow Head. Cat. No. VIII-A-362*b*.

FIGURE 2

1, 2. Lamellar flakes. From Portland Creek. Cat. No. VIII-A-291*j* and Cat. No. VIII-A-290*c*.
3. Worked lamellar flake. From Cow Head. Cat. No. VIII-A-353.
4. Object of dark grey chert, perhaps graver. From Cow Head. Cat. No. VIII-A-371.
5, 6, 7, 8. Triangular points. From Portland Creek. Cat. No. VIII-A-298*c*, Cat. No. VIII-A-298*e*, and Cat. No. VIII-A-302*e*, *t*.
9. Triangular point. From Portland Creek. Cat. No. VIII-A-304.
10. Triangular chert arrow point. From Keppel Island. Cat. No. VIII-A-227*g*.
11. Triangular chert arrowpoint with faceted tip. From Port au Choix. Cat. No. VIII-A-193*d*.
12. Stemmed chert lance or knife point. From Englee. Cat. No. VIII-A-76.
13, 14. Notched triangular arrowpoint and fragment of notched knife. From Portland Creek. Cat. No. VIII-A-300 and Cat. No. VIII-A-310.
15. Fragment of double-notched quartzite point. From Keppel Island. Cat. No. VIII-A-226.
16. Double-pointed chert knife. From Norris Point. Cat. No. VIII-A-409.
17. Notched chalcedony arrowpoint. From Cow Head. Cat. No. VIII-A-352.
18. Knife or lance point of reddish jasper. From Portland Creek. Cat. No. VIII-A-311*a*.
19, 20. Notched chert arrow or knife points. From Portland Creek. Cat. No. VIII-A-308*a*, *b*.
21. Notched quartzite knife point. From Englee. Cat. No. VIII-A-33.
22. Notched chert arrowpoint. From Cow Head. Cat. No. VIII-A-331.
23. Chert tool. From Englee. Cat. No. VIII-A-37.
24. Chert scraper. From Portland Creek. Cat. No. VIII-A-323.
25. Chert scraper. From Englee. Cat. No. VIII-A-80.
26. Chert scraper. From Cow Head. Cat. No. VIII-A-359*b*.
27. Chert scraper. From Keppel Island. Cat. No. VIII-A-230*a*.
28, 29. Chert scraper and drill-like point. From Portland Creek. Cat. No. VIII-A-314*k* and Cat. No. VIII-A-325.
30. Chert scraper. From Cow Head. Cat. No. VIII-A-359*a*.
31. Chert scraper. From Bell Burns. Cat. No. VIII-A-266*g*.
32. Chalcedony side-scraper. From Cow Head. Cat. No. VIII-A-356.
33. Chert side-scraper. From Bell Burns. Cat. No. VIII-A-269.
34. Chalcedony side-scraper. From Port au Choix. Cat. No. VIII-A-199.
35. Chert scraper. From Cow Head. Cat. No. VIII-A-359*d*.
36. Notched chert scraper. From Bell Burns. Cat. No. VIII-A-251.
37. Notched jasper scraper. From Portland Creek. Cat. No. VIII-A-314*g*.
38. Notched chert scraper. From Norris Point. Cat. No. VIII-A-414.
39. Notched chert lance or knife point. From Englee. Cat. No. VIII-A-36.
40. Knife of grey chert. From Keppel Island. Cat. No. VIII-A-228.
41, 42. Notched chert points for knives or lances. From Portland Creek. Cat. No. VIII-A-312*b* and Cat. No. VIII-A-313.
43. Notched point of whitish chert for knife or lance. From Cow Head. Cat. No. VIII-A-332.

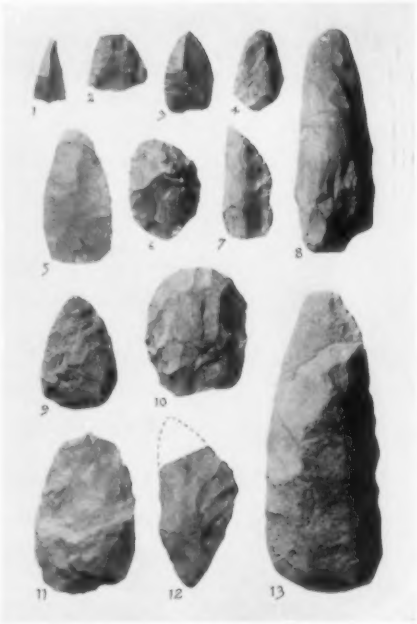


FIG. 1

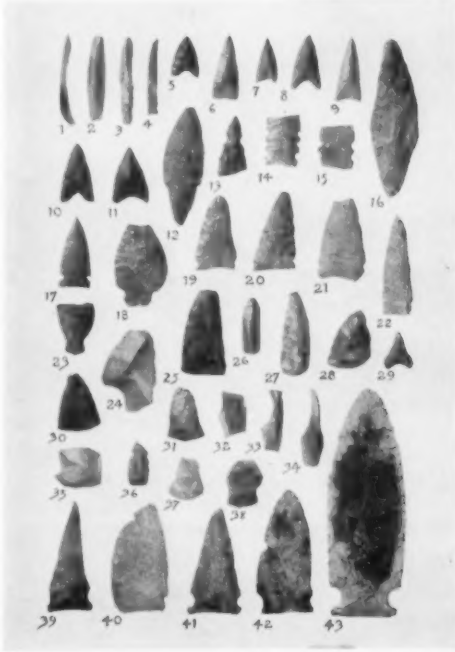
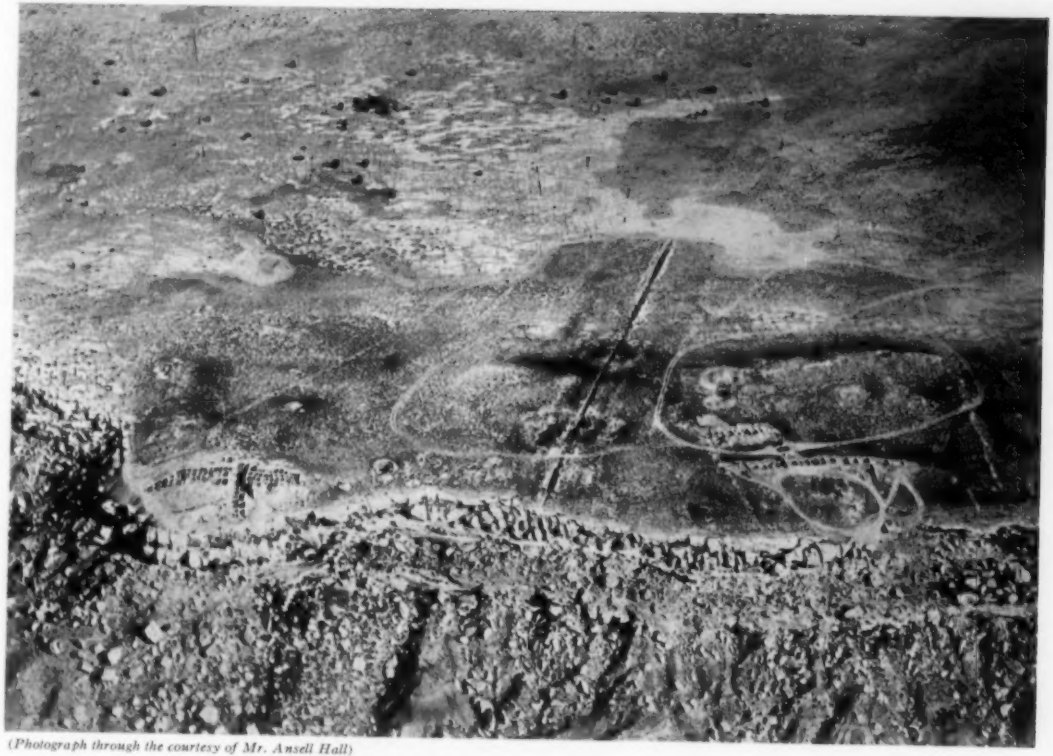


FIG. 2

Chipped Artifacts from Dorset Eskimo sites in Newfoundland.



(Photograph through the courtesy of Mr. Ansell Hall)

AIR VIEW OF AWATOVI FROM JEDDITO VALLEY SIDE
Showing 1935 trench and the 1936 and part of 1937 excavation.
The Church was not excavated when this picture was taken.

PRELIMINARY REPORT OF THE PEABODY MUSEUM AWATOVI EXPEDITION OF 1937

J. O. BREW[181]

THE third Peabody Museum Awatovi expedition, under the direction of the writer began work on July 12, 1937, and remained in the field until November 5, 1937. The explorations and excavations were carried on under permission of the United States Department of the Interior. The continuation of these studies was made possible by the contributions of Mr. and Mrs. William H. Claflin, Jr., Mr. Henry S. Morgan, Mr. and Mrs. Philip Allen, Mr. and Mrs. Raymond Emerson, and the Peabody Museum. Its primary objective was the securing of information relative to the post-Spanish period of Awatovi.

LOCATION OF THE WORK

Jeddito Valley and Antelope Mesa lie in the Hopi Reservation, Navajo County, in northeastern Arizona between 35° and 36° N. Lat. Antelope Mesa is one of the points of land which form the southern edge of the high plateau known as Black Mesa. Like First, Second, and Third Mesas nearby, where the modern Hopi Indian towns are located, it is not an isolated formation. These long, narrow points, juniper-clad where they are not too near to modern towns, have been carved out of the main mass of Black Mesa by southwest-running streams working toward the valley of the Little Colorado. Along the rims of the points and on the benches grading down into the valleys are thousands of prehistoric sites. Sixty-one sites were mapped during a rapid six weeks' survey in 1935 in a twelve mile stretch along the north side of Jeddito Valley alone. Six of these are large sites, comparable in extent to the modern Hopi towns. Awatovi, Kawaiokuh, Chakpahu, Nesuftonga, Kokopnyama, and Lululongturqui extend in that order from near the end of the point to above Jeddito trading post where the main road from the Hopi Agency at Keams Canyon to Holbrook crosses the Jeddito wash.

THE MAIN SITE

The reasons for selecting Awatovi, of all these sites, for major excavation were described at length in previous reports. However, since this report will deal largely with the 17th century town and the Franciscan Mission it will be well to review that part of the report of the 1936 season dealing with the historic period.

AIR VIEW OF AWATOVI FROM JEDDITO VALLEY SIDE
Showing 1935 trench and the 1936 and part of 1937 excavation.
The Church was not excavated when this picture was taken.

[181] Peabody Museum of Harvard University.

"Presumably the first of the Tusayan towns encountered by Tobar in 1540, it (Awatovi) was visited in 1583 by Espejo and in 1598 by Oñate. In 1629 the establishment of the Franciscan Mission of *San Bernardino de Aguatobi* was authorized and from that time until the Pueblo Rebellion in 1680 the inhabitants seem to have been in close contact with the Spaniards."

"After the Pueblo Rebellion twelve years elapse before mention of Awatovi is found again in the Spanish records. In 1692 the Moqui pueblos, including Awatovi, were visited by de Vargas with a military expedition and once more fell under the influence of Christianity and European Civilization. The re-acceptance of Spanish suzerainty and religion seems to have been more complete at Awatovi than in other Hopi villages to the west. This may have contributed to the eventual downfall of the town. The story of the destruction and abandonment of Awatovi is not very clear."

At present, based on Hopi tradition and very limited references in contemporary official New Mexican documents, the following story can be pieced out. Sometime, during the winter of 1700–1701, bands of men, probably recruited from the Hopi towns of First and Second Mesas, (there is great disagreement in Hopi stories on this point) attacked the village and massacred some of the male inhabitants. As far as our information now goes, this marked the end of Awatovi as an inhabited site. However, the unsatisfactory nature of this evidence is apparent, and the possibility of people living at Awatovi after 1701 must be considered. But we do know that at least one hundred and sixty years of life after the first Spanish contact are recorded in these ruins.

During the years, 1935, 1936, and 1937, the Awatovi Expedition made an archaeological site map and various geological and physiographic maps of the Jeddito Valley and Tallahogan Canyon. One small site was excavated showing remains of all of the early cultural periods from Basket Maker III to and including the classic Pueblo III. Contour maps have been made of four large sites on the mesa and testing begun in two of these. At Awatovi itself, where the main excavation is being carried on, approximately 500 rooms have now been excavated. The maximum depth of these excavations is thirty feet in the western mound, where accumulation of 500 years of cultural debris was found. The remains in these rooms at various parts of the site show a gradual development step by step from the classic Pueblo III of the early and middle 13th century to the time of the abandonment of the site, which was not many years after 1700.

During the course of this development, almost half a millenium in time, changes in pottery styles have been observed. The black-on-whites of Pueblo III give way to a black-on-orange, which is the first of the so-called Hopi colored wares. The designs in this black-on-orange and general treatment suggest that it arose from the combination of influences from both the Kayenta region to the north and Little Colorado to the south, meeting on the Hopi mesas. After the black-on-orange comes the first true yellow, still geometric in design and varying little from the black-on-orange except in color. This style lasted but a short time and was superseded before the beginning of the 15th century by the famous Jeddito Black-on-yellow ware with beautiful designs of highly conventionalized bird and animal figures. This fashion culminated during the decades preceding the Spanish invasion in pottery generally described as the most beautiful in the Southwest, Sikyatki Polychrome. After the inauguration of extensive European influence, which probably did not take place until the establishment of the mission in 1629–30, the technical and artistic excellence of the pottery suffered, for the most part, definite and startling change. Some careful work continued and examples of this during the early historic period cannot be distinguished from the preceding prehistoric wares. Most of the pottery, however, assumes a different and less fine character, and new types appear which we have named San Bernardino, after the mission. Eighteenth century Hopi pottery, which is generally known as Early Modern Hopi is not found at Awatovi.

Changes in the masonry are also observable over this period. The walls of the 13th century and early 14th century buildings are, as a general rule, double coursed, and much care was used in the selecting and shaping of stones. At later times in the 15th and 16th centuries, walls are universally single and definitely poorer in construction. At the same time, the rooms become larger, with the increase in length rather than in width. The reason for increase of only one dimension probably lies in the nature of the local supplies of roof beams. Both the length and breadth of a room could not be increased without bringing longer poles from considerable distance. Little change is observable in the Indian part of the historic town, where, of course, the Franciscan buildings present radical variation from Pueblo architecture.

The masonry, however, continues to be very poor. Although attempts seem to have been made in the earliest houses on the site to obtain as hard rock as possible, later masons seem to have been content with the easily obtainable rimrock of the immediate vicinity. This rock

is a very poor grade of sandstone and crumbles easily. In all of the later periods at the site, certainly, walls were covered with plaster, so that aesthetically the type of wall construction is of little importance. The crumbling quality of the rock, however, is probably one of the causes for the apparent rapid change of residence and continual building which seems to have characterized the Indian towns in the Hopi country at least since 1200 A.D.

In the course of our excavations in the various parts of the twenty-three acres of ruins comprising the town, we have found the earliest buildings at the bottom of the western mound. From this point, construction gradually spread to the east and to the north, so that during the black-on-orange period of the late 13th or early 14th centuries the buildings formed an L-shaped town, following the jog in the mesa edge at the western end of the site. At the same time, the town also was growing upward, and the rooms of the black-on-white period in the interior of the large main block were already filled with ashes and debris.

From this time on, the expansion throughout Pueblo IV, which is the period of Jeddito Black-on-yellow and Sikyatki Polychrome pottery, proceeded gradually toward the east. During the 15th and 16th centuries, the width of the town back from the cliff edge increased somewhat, but the main movement of residence was eastward. However, throughout the last prehistoric period some of the inhabitants of the town continued to reside in the early western section. The buildings of the black-on-white and black-on-orange periods had by this time fallen into disuse. At the extreme southwestern corner of the site there was now a small hill, fifteen feet or more in height, formed by the earlier buildings. On top of this a few Awatovians still lived, possibly a conservative element such as we see remaining in Old Oraibi today.

During the final century of the life of Awatovi, the inhabitants were almost entirely at the eastern end. Small buildings containing mission-type pottery and domestic sheep bones are found in the central part of the site, but the evidence is conclusive that concentration of population was around the large plaza to the north of the church. No evidence of 17th century occupation has been found in the western mound.

However, tests below the houses in the historic town show that even beneath the main plaza the remains of prehistoric houses are to be found, definitely establishing the fact that the full extent of the area now occupied by the ruin of Awatovi had been attained during Pueblo IV. From then on the concentration of population seems to have continued its progress toward the east. By the end of the 17th century,

with the exception of a very few small units, the townspeople were all collected around three sides of the large late main plaza, with the buildings of the Franciscan friary and the church on the south side.

Our knowledge of the development of other arts and industries must await more detailed study than we have at present been able to give. Certain definite conclusions have been drawn, however.

We know that from middle Pueblo III times, at least, coal was burned in the houses along the Jeddito. We know that the three-quarter grooved axe associated with the cultures of the Gila Basin in southern Arizona had spread up into this section of the Plateau country. We have evidence of the introduction of European domestic animals and plants during the 16th and 17th centuries, and we also can trace in material remains at least the impact of the new religion, Christianity, which appeared in the Jeddito in 1540 and actually began to build places of worship in 1629.

EXCAVATIONS

The excavations of the 1937 season at Awatovi were divided into four parts:

1. Section 1. The Franciscan establishment, including the church and the friary.
2. Section 2. Part of the historic town west of the main plaza and north of the mission.
3. Section 3. Part of the historic town to the north across the main plaza from the mission.
4. Test 22, which, although labeled a test, uncovered nine rooms and the largest Awatovi kiva yet found. This lies between Section 2 and 3.
5. In addition to these major excavations, tests of the kind developed during the 1936 season were continued at Awatovi and inaugurated at Kawaiokuh and Chakpahu. Seven more were dug this year at Awatovi and three at Kawaiokuh and one at Chakpahu. Further tests will be made at these sites next year.
6. One more kiva was dug in Test 14. The purpose of this excavation was to study wall paintings suspected to exist in this kiva.

In operation, the excavating force was split into two parties each with a supervisor. Work progressed continually in Section 1 and the second group was occupied at different times in the other three sections.

Section 1

The plan for the 1937 season was to excavate and, if possible, to complete all necessary work in the historic part of the town. This included complete clearing of the rooms in the Franciscan friary and church and excavation of two sections of the contemporary Hopi town.

Section 1, however, was not completed because of the unexpected size of both the church and friary and the equally unexpected number of burials found in this vicinity. Upon excavation, the church proved to be much larger than expected and to be lying in a different position. It was found to the east of the highest standing wall, although the latter had previously been thought to mark the eastern boundary of the ecclesiastical buildings.

The nave and sanctuary of the church were found to be over a hundred feet in length from the back of the altar to the main entrance to the nave. In front of this was an entrance-way with two columns, two round towers, and the baptistry. The latter was on the left-hand side of the entrance and outside the nave. Liturgically this is the proper position for the baptistry, on the gospel side and near the entrance. The baptismal font was still in place with a similar secondary structure in the southwest corner of the room. Two post holes were found four meters inside the main entrance to the nave at the east end in proper position for supporting the choir loft which usually appears here in 17th century New Mexican churches. The main altar made of adobe bricks was, when uncovered, in an excellent state of preservation, and two side alters were found as well. These altars were all of the temporary kind, and, in the center of the main altar, was found a recess for the altar stone. The probable position of the tabernacle could also be made out.

To the right of the sanctuary was a large chapel which probably served as the sacristy. Through this room, by means of a doorway and short flight of steps in the southwest corner, entrance was made to the friary by means of a long ambulatory with rooms giving off it on either side.

The most interesting feature of this end of the church was the number of architectural revisions for which evidence was found. Although always maintained at the requisite height of three feet, four inches, the size of the main altar had been increased twice, so that we found actually that there had been three altars. At the same time, it was discovered that the side altars were not part of the original construction. In fact, the building of the side altar on the right-hand side blocked up the

original entry to the sanctuary from the sacristy and another entrance had to be cut through the wall farther out toward the nave.

Another feature which had been present during the early days of the use of this church but which was later obliterated was what seems to have been a private friar's choir to the right of the main altar. This consisted of a communion rail set in the wall above which was an opening permitting a view of the main altar. In this way, the friars could read, sing, or meditate in private completely protected from the gaze of those in the nave of the church, and at the same time obtain a satisfactory view of the main altar.

Subsequent enlargements of the altar seem to have made it necessary to close up this opening. It is possible that a private chapel will be found elsewhere which took the place of this.

Approximately one half of the friary (behind, to the west of the church) was excavated. Here again a great deal of revision had taken place in the position of doors, windows, benches, etc. The European influence was immediately discernible in the different character of both ground plan and detail of masonry in this section. The rooms are much larger, equipped with many more benches, and have corner fireplaces, which are so common in the house architecture of the Southwest at the present time.

Of greatest interest in connection with these changes was the fact that our excavations seem to indicate that, in parts of the friary, the last structures built and the last changes made were by the Hopis in relative freedom from European suggestion or direction. The participation of Awatovi in the Pueblo rebellion of 1680 is a matter of historic record. We have definite knowledge that the Spaniards were at this time expelled from the country, and it would seem that, after their departure, their quarters may very well have been revised for native use. The nature of many of the later walls in this section suggests the possibility of such an occurrence.

Most of the northern side of the friary was excavated and the central quadrangle was cleared about one third of the way towards the middle. The entire southern section, however, had to be left until the next season.

Because of the unfinished nature of this part of the excavation, it is of course impossible at present to pronounce definite conclusions. One can, however, say that, throughout the church and the friary buildings, considerable evidence of revision, rebuilding, and expansion under the direction of the priests themselves can be seen. Also, it seems quite

probable that we have evidence of an occupation and partial revision of this part of Awatovi by the native Pueblos after the departure of the Franciscan fathers in 1680.

In all, seventy-two rooms were cleared in this section, including the church.

Section 2

A little north of the western end of the friary and along the west side of the large plaza of the historic town lie the remains of a small Hopi building in which two rooms (Tests 5 and 6) were dug last year. These two rooms had been burned, and the debris had never been cleared out, so that the roof timbers were to be found as well as pottery and other artifacts which were in the rooms at the time of the fire. The surface indications that this unit was relatively small and the probability of numerous finds therein led to its selection as the first excavation in the native town of the 17th century. Twenty-eight rooms were cleared in this section, some of them being prehistoric rooms of the last Sikyatki period which were found beneath the later rooms. The evidence of fire mentioned above in Tests 5 and 6 was found also in surrounding rooms, but it does not appear that this building had burned entirely.

Section 3

The last major excavation of the season, which does not appear on the accompanying aeroplane photograph, was in the highest mound of the modern town, to the north of the main plaza and opposite the Franciscan group. A double row of rooms was excavated from the plaza completely over this mound. At the top, a test was sunk to bed-rock fourteen feet below the present surface. A bed-rock test was also made at the south end near the plaza. In both cases it was found that prehistoric occupation was present beneath the levels of the historic town. In fact, the walls of Sikyatki buildings can be traced on the surface of the large historic plaza. Therefore, it seems to be established that the full extent of the town in area was attained in prehistoric times, and that the houses of the 17th century town are built upon the remains of the previous Sikyatki town. In Sections 2 and 3 the finds in the upper rooms were those of the mission period, marked particularly by characteristic modified pottery types, some entirely new pottery types, an occasional object in pottery or metal of European manufacture, and bones of sheep and other domestic animals of European introduction. In the lower rooms, the European objects are absent and only prehistoric pottery types are found.

Test 22

The original purpose of the excavations at Test 22, which is to the north of Section 2 near the northwest corner of the large plaza, was to provide space for dumping the earth taken out of Sections 2 and 3. The distance of these sections from the mesa edge makes dumping over the cliff impractical. Also, it seemed desirable to hold a considerable amount of earth on the site for refilling. With this in mind, it was first necessary to test thoroughly the area we were about to cover up.

In all, ten rooms were excavated in Test 22 with results similar to those in Sections 2 and 3; namely, rooms of the historic period near the surface with Sikyatki occupation below.

In addition to the rooms, a kiva almost six meters in length by five meters in width was uncovered. Like all kivas in the later sites in this region, it is rectangular. The floors and benches are completely covered with flagstones, in which are drilled many small holes, which may very well have been used for setting up loom uprights. Three loom weights were found on the benches of this kiva and a number of hemispherical depressions were found in the slabs forming the step of the bench at the proper height to have been the opposite brace to the heavy portable loom weight, for holding the lower horizontal beam of the loom.

As in all other Pueblo IV and Pueblo V kivas in this region, two firepits were found, one containing wood ash and the other, coal ash. A large number of roof beams were found on the floor and one post with rope wrappings. At the time of writing this report, the dendrochronological studies of the large collection of beams and charcoal samples obtained during the 1937 season have not been completed, so that no tree-ring dates are available. However, other finds indicate that this kiva was in use during the historic period.

Tests

Seven more tests were dug at Awatovi during the 1937 season. These were, with two exceptions, all in the Sikyatki parts of the town, mainly to determine the character of the occupation along the north central section. One extensive test was put down in the mission period refuse mound on the eastern border of the site, and one further test made into the black-on-orange levels on the eastern slope of the western mound.

The program of testing at the other big sites along the rim of Antelope Mesa was inaugurated with three tests at Kawaiokuh and one at Chakpahu. Test 3 at Kawaiokuh showed a high percentage of Jeddito Black-on-orange sherds at the lowest level. The Chakpahu

test, which was a shallow excavation of only two meters depth, showed predominant black-on-white throughout, with a falling percentage of Jeddito Black-on-orange which ranged from 18% at the top level to zero at the bottom level. Yellow wares found on the surface at Chakpahu demonstrated that it was in use during the Sikyatki period of Pueblo IV, but the largest occupation seems to have antedated this.

Test 14 Kiva

Room 3 in Test 14 at Awatovi was excavated in order to obtain more mural paintings of the type found during the 1936 season. This work was under the direction of Mr. Watson Smith. Two of the walls of the kiva exposed on the surface showed the presence of wall paintings. In many cases, the plaster as well as the stones of Awatovi walls may be observed on the surface of the ground, and painted layers in the plaster are readily discernible. Excavation revealed the best-preserved painted wall yet excavated. As usual, there was a large number of layers of plaster on each wall. Painting was present on three of the four walls of the kiva. The slope of the site at this point down to the cliff edge had removed all except a few inches of the south wall, so that we have no information about the fourth wall. At some time during the use of the kiva, a new wall and a bench were put in at the north end so that, actually, there were at this end two separate painted walls. The later construction assisted materially in preserving the earlier wall on which the sandy plaster was found to be in very good condition. Fifteen painted layers were found on the original north wall, five painted layers on the later north wall, and nineteen painted layers on the east wall. In some cases the paintings were continuous on the two walls. The plaster on the west wall was so badly damaged that no evidence was obtainable except that it had been painted.

Some of these paintings were very complicated indeed. Mostly geometric in the style of symbolic Sikyatki pottery design, they included nevertheless some attempts at realistic representation of birds, men, and animals.

As well as these additions to the collection of kiva paintings, approximately twenty-one painted layers of plaster were found on the walls of the church. These were particularly well preserved in the sanctuary and on the main altar. They consisted of geometric and floral motifs of European patterns sometimes arranged as representations of decorated tiles.

[BREW] PLATE VIII
AMERICAN ANTIQUITY, VOL. V

(*Courtesy "Harvard Alumni Bulletin"*)

Excavating a kiva at Awatovi.

(*Courtesy "Harvard Alumni Bulletin"*)

FIG. 1.

FIG. 2.

PREHISTORIC MURAL PAINTINGS AT AWATOVI

FIG. 1.—Anthropomorphic designs on a kiva wall.

FIG. 2.—Design #11, North Wall B, Test 14, Room 3.

RECONNAISSANCE

Geological and Physiographic Survey

Physiographic studies of the Jeddito region were inaugurated during 1937 by Mr. John T. Hack of the Geology Department of Harvard University with Professor Kirk Bryan as advisor. Mr. Hack's preliminary report includes a description of (1) the general physiography, including climate and general topography; (2) the physical basis for primitive civilization, including location of villages, water supply, types of Hopi fields and methods of watering; (3) geology of the Jeddito Valley alluvium, including description of the three major valley fills discovered and history of the deposition and erosion of these fills, causes for downcutting of the arroyos, and estimate of the possibility for agriculture in the past; and (4) other physiographic features, such as dunes and landslides.

Modern Hopi Corn Fields

In connection with the physiographic survey, a number of corn fields in Tallahogan Canyon were mapped. The object of this study is to show the specialized development of Hopi agriculture and the way in which the unusual physiographic features of the region are utilized in obtaining water for crop production.

Air Survey

Through the kindness of Mr. Ansel F. Hall, Director of the Rainbow Bridge-Monument Valley expedition, the Awatovi expedition obtained forty-one aeroplane photographs. The plane was owned and piloted by Miss Amy Andrews of New York City, and photographs were taken by Mr. E. P. Beckwith of Garrison, New York. These included pictures of the excavations of Awatovi; of the other large sites along the Jeddito, at present unexcavated; of modern Hopi agricultural development in Tallahogan Canyon, in the Oraibi Wash, and in Bluebird Canyon; of the modern Hopi towns on First and Second Mesa; and a number of general views showing the relationship between the site of Awatovi and the Jeddito Valley and Tallahogan Canyon on either side of it. In these valleys today are located Navajo and Hopi corn fields and much of the food of the inhabitants of Awatovi must have come from these same valleys.

BURIALS

During the course of the season, 100 burials were uncovered at Awatovi. The bones of many of them were in a better state of preserva-

tion than has been the case in the few burials found during previous seasons. In addition to pottery and stone and bone objects, a surprisingly large amount of perishable material was obtained from these burials. Ordinarily, baskets and cloth objects are not expected except in the burials in dry caves. During 1937, however, we were fortunate in obtaining many articles usually not found in open site burials, among which were baskets, cloth bags, and many fragments of cloth, rope, twine, leather, and wooden objects including Hopi *pahus* (prayer sticks). Much of our success in preserving this extremely fragile material was due to the careful work of Mr. William H. Claflin, Jr., who was in charge of this part of the excavation.

POLLEN ANALYSIS AND ITS BEARING UPON AMERICAN PREHISTORY: A CRITIQUE

LOREN C. EISELEY[182]

EXTENDING over a wide area in northern and central Europe great beds of peat cover stretches of moor and occupy valleys and depressions where sluggish drainage has favored the growth of marsh vegetation.[183] More than any other soil type they are entirely dependent in substance on the vegetation which they support. Thus they are peculiarly reflective of changes of a climatic nature, and this, combined with the preservative effects of bog acid, both upon pollens and artifacts, has made them a peculiarly effective medium for investigation.[184] While most thoroughly studied in Europe, peats occur in both the northern and southern hemisphere wherever conditions permit. Typically and most extensively however, they are a circumpolar phenomenon closely attendant upon glaciation.[185]

The close of the glacial period brought about the conditions which resulted in most of the peat deposits in which we are interested today, both in America and Europe. The melting ice, high humidity and blocked drainage resulted in rapid accumulation of the deposits.[186] As the ice retreated northward and new drainage channels were carved out, the rate of peat accumulation adjusted itself. Peat cannot accumulate, however, unless swamps or ponds of some nature are present. Hence peat bogs are typically confined to the woodland areas of North America, in the United States east of the Dakotas and north of the 40th degree of latitude.[187]

Deposits of interglacial peat, though known, and of some importance to the paleobotanist where their age can be established, do not concern the American archaeologist, at least at present. The importance of peat bogs throughout the postglacial period lies in their preservation of pollens with which it becomes possible, through comparable profiles, to establish an arbitrary time scale over a period too short to allow the evolution of suitable index fossils[188] yet long enough to have witnessed vast archaeological changes. *The pollen analytical method, in short, aims at the establishment of a postglacial chronology based upon climatic fluctuation which may or may not be synchronous throughout the world.*

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[182] Assistant Professor of Anthropology, University of Kansas.

[183] Seward, 1931, p. 501; Rigg, 1916, p. 316. [184] Newbigin, 1936, p. 68.

[185] *Ibid.*, p. 63. Also see Fig. 7. [186] Soper, 1919, pp. 7, 9, 13, 35, 37.

[187] *Ibid.*, p. 6. See also Giles, 1930. [188] Godwin, 1934, p. 326.

At first, knowledge of the postglacial fluctuation of forest types was derived from studies of vertical succession in buried forest beds, and from observation of the grosser remains in peat bogs such as twigs, leaves and stumps. During this period of reconstruction of climate through studies of gross structure, it became apparent that postglacial times in Europe had witnessed cyclic variations of precipitation and temperature which seemed to hold true over wide areas. These observations gave rise to a terminology which is still current, and worthy of repetition at this point. Blytt, in 1882, indicated it as his opinion that, after a transitional, immediately post-glacial, sub-arctic period, the climate of northwestern Europe went through a cycle, repeated twice, of warm dry "continental" climate and warm damp "oceanic" periods.[189] These were called, respectively, Boreal, Atlantic, Sub-boreal, and Sub-Atlantic. Sernander reaffirmed this evidence[190] and the theory, now supported by many workers and a considerable body of evidence, is popularly known as the Blytt-Sernander hypothesis.

As time passed and the limitations of the older types of investigation became apparent, attention was directed to the possibilities offered by the newly devised method of pollen analysis. The idea was a Swedish innovation originating with Professor Lagerheim of the University of Stockholm.[191] The development of methods and technique, however, came about through the efforts of Lennart von Post of the Swedish Geological Survey. Since 1916 he has been a constant contributor to the subject and his cautious and scientific approach have led to a more elastic revision of the Blytt-Serpander hypothesis—a revision now widely accepted.[192] This modification von Post regards as necessary because, as he says, "For other regions . . . where the climatographical situation is too different from that of Scandinavia, the Swedish scheme . . . affected these investigations like a strait-jacket."[193] Accordingly he divides postglacial time on a climatic basis into (1) a period of increasing warmth, (2) the period of maximum warmth, and (3) the period of decreasing warmth. These periods somewhat correspond to Auer's arrangement of Fuegian climatic fluctuation—that is, to his *Subarcticum* of late glacial time, the *Melioratum Periode* of postglacial time and the third *Peioratum Periode* of climatic regression which probably saw the first appearance of man in Fuegia.[194]

The amount of work which has been accomplished in Europe is

[189] Blytt, 1882. [190] Sernander, 1908. [191] Lagerheim, 1905.
[192] Godwin, 1934, p. 279; Fuller, 1935; Sears, 1935.
[193] von Post, 1931, p. 52. [194] Auer, 1933, p. 287, 297.

enormous as contrasted with that carried out in the New World and it is unlikely that the same amount of information will be available here for a generation or more.[195] In addition, European workers have had the added advantage of opportunities to check their observations against a number of other indices of postglacial change such as archaeological remains,[196] the Litorine Transgression, and the movement of marine mollusks.[197] It remains to be seen whether, lacking certain of these cross checks, the method can be made as applicable to archaeological problems here in America.

So far as the writer has been able to ascertain, it was a paper by Dr. Paul B. Sears, then associated with the University of Oklahoma, which first succeeded in arousing the interest of American archaeologists generally in the possible application of the pollen technique to American problems. This paper appeared in the *American Anthropologist* during 1932[198] and was entitled the "Archaeology of Environment in Eastern North America."

Dr. Sears' paper, while concerned wholly with the possibilities of determining the influence of climatic fluctuation upon the peoples of the eastern woodland, chanced to come at a time when attention was shifting westward to the area of the high plains. Strong was making his first studies of Nebraska archaeology. The magic word "Folsom" was on every archaeologist's tongue. It was, perhaps, but natural that the chart of suggested postglacial climatic fluctuations extending back for ten thousand years and accompanied by a series of estimated dates, should have immediately intrigued students of the subject. Archaeologists, impressed by the apparent successes of the method in Europe showed an immediate tendency to utilize the new method in the solution of pressing problems on the high plains. Though the results have been disappointing and though Dr. Sears has lately expressed an opinion[199] in the direction of von Post's more cautious modifications of the Blytt-

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[195] G. Erdtmann has also been an extremely valuable worker in this field and is chiefly responsible for making the method internationally known. His bibliographies of the huge mass of data assembled by European workers are indispensable to any serious approach to the subject and he has contributed to the improvement of the technique as well. See, for example, Erdtmann, G., 1931*b*. Erdtmann, and Erdtmann, 1933.

[196] Godwin, 1934, p. 346. [197] Clark, 1936, Chapter I.

[198] Sears, 1932*a*. It was, however, preceded by a briefer statement in Science, N.S., 73: 640–641, 1931.

[199] Sears, 1935. His latest comment (1938) is extremely measured and reveals full consciousness of many non-climatic factors influencing vegetational change.

Sernander hypothesis,[200] the archaeologist is still unwearied. At each site he dutifully saves samples of soil and hopes for the best. It is not my intention to discourage these painstaking analyses but to indicate briefly the history of the new method in North America and the difficulties which beset it.

It is a long deplored fact that American paleobotany has lagged considerably behind the development of this subject in Europe. In 1912, for example, we find the distinguished botanist Edward W. Berry complaining: "One phase of the study of fossil plants, alike disgraceful to American geology and to American botany, is our lack of knowledge of the flora which immediately preceded the present one. As compared with the monumental work on the glacial, interglacial, and postglacial floras in Great Britain and Scandinavia, Denmark, and Germany, almost nothing has been done in the United States."[201] Even at this early date Berry specifically recognized the need for peat bog study and urged its intensive development.[202] It was not, however, until the pioneer work of Dachnowski-Stokes in 1921[203] that peat as a possible indicator of past climates began to be seriously studied in America. The pollen-analytical method was still unknown here so that time estimates were based on the rate of growth of the deposits, and determination of climatic oscillation upon the gross examination of the contained remains of plants.

Dachnowski-Stokes recognized the limitations of this method, and after considerable discussion, in which he brings forward evidence for a long postglacial warm period,[204] he frankly admits: "As to the end of the late glacial time, the climatic characteristics from the last glacial recessions to postglacial and present conditions stand as yet considerably ill-defined."[205] As a correlative of this he confesses the inadequacy of the data to supply evidence of parallels in climate over wide areas.[206]

Shortly after this he attempted a bolder statement of his theories, including a rather detailed chart of climatic fluctuations dating from the period of the ice withdrawal.[207] Apparently acting upon the assumption of an exact contemporaneity of the Würm and Wisconsin ice movements[208] he postulates "that there have been several climatic

[200] von Post, 1931, pp. 48–54. [201] Berry, 1912, p. 174. [202] *Ibid.*, p. 175.
[203] Dachnowski-Stokes, 1921. [204] *Ibid.*, p. 81. [205] *Ibid.*, p. 86.
[206] *Ibid.* [207] Dachnowski-Stokes, 1922.

[208] While the major correlation is probably justified, the fact of a more southward stand of ice in America as well as the question, still debatable, of the influence of the period of marine transgression in bringing on the first "oceanic" Atlantic climate in

waves since the last glacial period, each of relatively long duration. The climatic pulsation, resembling a climatic belt, consisted of a cold and humid period bordering the glacial readvance, followed by a warmer dryer period in the accompanying interstadial time, with a tendency toward optimum conditions which favored the growth of forests. It is quite probable that the last climatic wave or belt, possibly in diminishing intensity, continues to shift northward at the present time."[209]

The scheme and the estimated dates do not seem to have taken hold. Diverse estimates upon the rate of peat accumulation are partly responsible for this, along with the difficulties involved in calculating the relative age of the deposits.[210] (See footnote 208 above.) The chart reproduced by Dachnowski-Stokes is considerably at variance with the later one of Sears in the *Anthropologist* and it is interesting to contemplate in connection with these various schemes the variety of places into which it might be possible to insert the molluscan fauna which the writer has discussed elsewhere.[211] Dachnowski-Stokes, for example, goes further back in time than Sears, and inserts a warm humid phase as long ago as 18,000 B.C. We need not labor the point, however. Suffice it to say that the greater sensitivity of the pollen technique has tended to shift attention away from schemes based on less refined methods.

Before turning to pollen analysis proper, it may not be amiss to indicate that the year 1922 also saw the appearance of Gleason's "The Vegetational History of the Middle West"[212] to which we shall devote more space in a later section. Based on a study of relict vegetation, including the appearance of prairie relicts in the present deciduous forest region of the north central states, it argues for the existence of a postglacial dry warm period during which prairie conditions obtained farther eastward than at present.[213] Recently some of the inferences derived by Gleason, including his theory of an early postglacial xeric period, have been strongly challenged by Transeau.[214] This does not, however, greatly alter Gleason's point, used elsewhere in this paper, of a restric-

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Europe, makes us pause. Again, particularly at the time of Dachnowski-Stokes' work, there is a lack of geological data bearing on the relationship of certain of the bogs investigated to the various substages of the Wisconsin ice.

[209] Dachnowski-Stokes, 1922, 229–230.

[210] Sears, P. B., and Elsie Janson, 1933, pp. 349, 350.

[211] Eiseley, 1937.

[212] Annals of the Association of American Geographers, 12: 39–85, 1922.

[213] See also Cowles, 1928, pp. 380–382.

[214] Transeau, 1935; also Fernald, 1935.

tion of bog areas westward,[215] nor need we labor the problems of floristics farther at this point. It is to pollen methods that most botanists now look for confirmation of their theories of past climates.

Vaino Auer, the Finnish scientist, also noted for his study of pollen profiles in Tierra del Fuego, is, to my knowledge, the first man to carry on an investigation of American peat bogs by means of the pollen technique.[216] His investigation covered some thirty peat bogs in the neighborhood of the St. Lawrence River. In general, Auer finds that the Blytt-Sernander classification of postglacial climates can be adapted to the Canadian situation.[217] He says: "Thus the earlier dry and warm period corresponds to the boreal period, the then following one, the Atlantic period, and the thereupon following dry and warm period corresponds to the sub-borealic one." Auer indicates certain differences between the profiles and those of Europe, however,[218] and further remarks, "that the character of the various periods may have been different from that of the corresponding periods in Europe, and that the beginning and end of each period may, perhaps, have been of slightly different age on each continent." In a later work Auer expresses far more doubt than this over the possibility of world-wide pollen profile correlations[219] and remarks that the only certainty seems the fact of climatic improvement in postglacial time.

Following Auer, several other investigations were carried out. Lewis and Cocke[220] studying pollen samples from the Great Dismal Swamp of Virginia reported some evidence of climatic variation not inimical to the results of Auer's previous analyses, but climatic theories are held in abeyance by the authors.

Sears has reviewed a great deal of following material[221] and has attempted to fit it into the scheme of his own researches, the results suggesting "a strong parallel with European postglacial fluctuations" with "two major periods of desiccation, or continental climate, the second warmer than the first."[222] Lately, however, since the work of Voss and Fuller[223] in the Lake Michigan region has revealed no clear

[215] Sears, 1932*b*, indicates some confirmation of Gleason's views on the origin of the "prairie peninsula" except that he does not regard the period of prairie expansion as having been excessively warm since bogs survived the postglacial dry in this area. Sears hesitates however and adds that his view may have been based upon "a too static conception of the character of relicts." [216] Auer, 1927.

[217] *Ibid.*, p. 28. [218] *Ibid.* [219] Auer, 1933, p. 306.

[220] Lewis, I. F., and E. C. Cocke, 1929. [221] Sears, 1932*b*.

[222] *Ibid.*, p. 5. Bryan, 1932, provides a good summary of the earlier American pollen studies. [223] Fuller, 1935; Voss, 1934.

evidence of the alternation of moist with dry phases during postglacial time, Sears has expressed himself on the advisability of examining more evidence before definitely accepting the Blytt-Sernander hypothesis. In the meantime, he says: "The simple schedule of von Post[224]—a period of increasing warmth, period of maximum temperature, period of decreasing warmth—is broad enough to allow of future refinement, and does no violence to facts."[225] With this statement by the most ardent advocate of the Blytt-Sernander hypothesis among American pollen specialists, the subject is brought down to date. It will be seen that the conclusions just voiced are somewhat more temperate than the suggested chronology which appeared in Sears' *Anthropologist* article and reflect as well the caution of such men as von Post and Auer. In the following sections it will be our purpose, at the risk of some repetition, to survey certain of the difficulties involved in the proper use of the pollen analytical method in order that these may be fully visualized by the anthropologist and some notion gained of its present limitations in the field of archaeology.

THE TECHNICALITIES OF METHOD

The technicalities of method involved in pollen analysis, while well known to all workers in this field, are complicated and insufficiently known to the layman. Some comment, though brief, should indicate the care and discrimination which must be exercised in the calculation of results. Since the method is more or less in its infancy in North America and there is a serious scarcity of trained workers it is especially desirable that some of the difficulties involved should be realized.[226]

The pollen flora of recent geological deposits is always derived from the surrounding vegetation. The pollen of the forest trees, however, always represents a large proportion of the total pollen in all peat bogs and is the major concern of the observer. This is because the trees represent the natural climatic dominants and, in a general way, are less likely to reveal purely local successions which are due to edaphic changes in the bog as it continues to age.[227] Often the non-tree pollens yield valuable information relative to these local conditions but are not regarded with such favor as chronological indices, at least in Europe.

[224] von Post, 1931. [225] Sears, 1935.

[226] Even a slight clumsiness in the handling of the cover-slip at the final mounting, for example, will cause an over representation of large pollen grains, by the squeezing out of smaller grains around the edges of the cover glass. This apparently trifling point is indicative of the care which must be used at all times even in such routine matters as the handling of material.. [227] Godwin, 1934, pp. 278, 287.

In America, Sears has emphasized the uses of grass pollen.[228] It remains to be seen, however, whether the latter will prove as acceptable to other workers in the area of the "prairie peninsula."[229] Certainly care must be exercised in cases of attempted correlation of the central continental group of peat lands characterized by fluctuating and unstable supplies of moisture with the northern peat region whose supplies of moisture are more abundant and sustained.[230] This problem is apt to grow more difficult south and west where moisture becomes scant and insufficient. Bogs or alluvial muds in such areas must inevitably dry up at many periods and hence their pollens, even when preserved, do not represent the sustained sections of the northern bogs, but only unstable and largely unpredictable "catches" of pollen. Such "catches" are not without their uses as when, for example, a trace of corn pollen, even a single grain, might throw light on the early practise of agriculture in the neighborhood. The validity of such climatic rhythms as might be observed, however, is something that only the future can determine. Certainly our technique would have to be immensely refined beyond that of the present to deal satisfactorily with deposits representing such a complex of influences—climatic and otherwise.

Bacteria and complete oxidation are involved in the processes of pollen decay. Hence pollen is always best preserved in unaerated, waterlogged deposits whether of organic or inorganic origin. In the latter case, clays and silts often preserve pollen but identification of the grains, owing to the coarseness of the containing medium, is more difficult than in the case of peat. Acid bogs are always better preservers of pollen than the alkaline ones.

Tree pollens vary greatly in their ability to resist disintegration, but as Godwin says, "it is difficult to see how such differences can be evaluated."[231] Probably such variation is not of importance so long as

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[228] Sears, 1932*b*, p. 4.

[229] Voss, for example, says of the non-tree pollens: "I regard them as having less value as climatic indicators than the tree pollens. It is extremely difficult to separate into species many of the pollens of the large families such as Cyperaceae and Graminaceae. Furthermore, many members of these families have wide ranges of distribution which, in general, is not true of members of tree families. Non-tree pollens are only of value in the interpretation of local conditions . . . ." Voss, 1937*b*.

[230] Dachnowski-Stokes, 1935, pp. 173–77.

[231] Godwin, 1934, p. 289. Also Voss, 1937*a*. Voss also indicates (p. 120) the interesting fact that in the study of one bog the presence of a large number of snails which devoured considerable organic vegetable material strongly influenced the pollen count—another indication of the complex play of influences which must be taken into account.

we are dealing with similar deposits and similar plants. It is not beyond the range of imagination, however, to conceive of it as being a factor of some weight when attempting to correlate muds or other alluvial deposits with bog successions far northward and, in the south, where there is less reliance upon the pollens of the climax forests.

A minimum of 150 counted grains of tree pollen is regarded by most authorities as a necessity, in the case of most samples,[232] and this exclusive of certain types, in order to eliminate, or at least reduce, the margin of error. Great care needs to be taken to identify the pollen grains, and Erdtmann has emphasized the fact that everyone working in this field "should have access to reference preparations of pollen-grains from recent trees."[233] This, of course, forms more of a problem in America than Europe where pollens have been longer studied. It is noticeable that in one of the first American studies, that of Lewis and Cocke,[234] difficulty was indicated in this regard. Erdtmann has expressed himself most emphatically upon the subject, declaring "a thorough study of the recent and sub-recent pollen flora of American bogs would be more valuable as a start for pollen statistics in America than the presumably hazardous task of identifying a multitude of pollen types from old deposits with material often much decayed and altered."[235] Fortunately, these efforts seem well under way, though the publishing of more American material bearing on identification and technology should be urged. Many prospective workers are handicapped by insufficient information of a practical nature because of the dearth, until very recently, of botanical interest in this field.

THE PROBLEM OF CORRELATION BETWEEN EUROPEAN AND AMERICAN POSTGLACIAL CLIMATIC FLUCTUATION

In Europe, if, for the moment, we accept the elaborated Blytt-Sernander classification[236] rather than von Post's more generalized scheme, we find that these cyclic climatic changes are capable of a certain amount of check through other sources such as faunal sequences,[237] land movement, and archaeological remains. Most of these cross checks are yet inapplicable in the New World.

[232] Barkeley, 1934; Erdtmann, 1931*b*. [233] Erdtmann, 1931*b*, p. 400.

[234] Lewis and Cocke, 1929, p. 40. [235] *Op. cit.*, p. 401.

[236] For a full chart of this climatic scheme as related to the archaeology of northern Europe see Clark, 1936.

[237] Not so developed for postglacial America, though the postglacial disappearance of *Bison antiquus* Taylori, Elephas, Equus, and Camelops as well as the giant sloth may be of assistance if we can determine more exactly the time of their disappearance. The

If we now examine Sears' most detailed chronology we observe that he maintains a somewhat similar sequence for eastern North America.[238] This sequence, however, is based entirely on pollen and rates of peat accumulation and not at all on faunal or other evidence. This is not said as criticism. The necessary material has simply not been available. It is to be hoped, however, that the remains of fossil "Pleistocene" forms which have occasionally been reported from bogs in the eastern United States will, in the future, be checked for possible pollen correlations with the deposits from which they have been secured. Such studies will inevitably help to establish the exact period of postglacial extinction of these animals.

The sequence maintained by Sears has, of late, been vigorously questioned. Fuller has recently summarized considerable data[239] bearing upon the peat deposits of the Lake Michigan region and at the risk of some repetition his main points should be summarized along with the similar observations of Voss. The work of these writers substantiates the period of conifer dominance[240] recognized in the cool humid of Sears and dated provisionally by him in the neighborhood of ten thousand years ago. The evergreen forest, Fuller observes, "seems soon to have been invaded by a deciduous element and probably before a fourth of postglacial time had elapsed the forests around the southern tip of Lake Michigan had assumed an aspect and composition very similar to those existing at the coming of the ox and of the white man. The record seems to show that for some three-fourths of the post-glacial period (perhaps for 15,000 years) oak-hickory forests with an admixture of elm, basswood, and a small amount of maple have occupied the morainic uplands of northern Illinois and southern Wisconsin . . . . No variation in the pollen diagram is great enough to indicate a decided climatic or vegetational change."[241]

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lemmings, circumboreal in distribution, and indicative of glacial conditions when found southward in Europe, have not been found fossil in the New World although doubtless they moved southward in this region as well. (Allen, 1919.)

[238] Sears, 1932*a*, pp. 617–21. [239] Fuller, 1935.

[240] It is worth noting that in the case of all these waves of vegetation passing northward the climate is not the only factor to be considered. "Succession," as Blake has said, "waits on the formation of soil." (Blake, 1926.) After the glacial scouring, the tundra plant remains collect and form soil for the succeeding biota along the retreating edges of the ice. (Voss, 1934.) Also see Lee, 1924. Hutchinson has pointed out that deciduous hardwood forest encroaches on the conifers but lags behind temperature changes, being partially dependent on rate of soil development. He regards these as climax forests, one of whose prime requirements is most highly developed soil. (Hutchinson, 1918.)

[241] Fuller, 1935, p. 485. In confirmation, Hansen, 1937, p. 147, says: "the deciduous

Voss, in a study of fourteen bogs distributed in Illinois, Wisconsin and Minnesota has also failed to correlate his results with the Blytt-Sernander hypothesis and maintains with Fuller that beyond the period of conifer dominance his pollen charts show no evidence of climatic fluctuations similar to those in Europe.[242]

Sears has countered that perhaps periods of xeric vegetation are not so distinct in the Lake Michigan area owing "to the buffering of this region by the proximity of Lake Michigan, or to certain technical difficulties in connection with the analysis, as for example the problem of distinguishing various species of oak."[243] More recently, in a paper read before the Symposium on Early Man held at the Academy of Natural Sciences in Philadelphia,[244] he has maintained that the more detailed use of grass pollens might reveal changes not evident in the tree profiles.[245] It would seem dubious, however, whether for the purposes of archaeological dating, much reliance can be placed on climatic changes seemingly so minute as to have affected grass and not trees,[246] or to involve detailed distinctions in oak forest. Certainly such technicalities seem to imply a long and wearisome period of detailed development. Again, if climatic "buffering" has affected the record, the close association of so many of the peat bogs with the area of the Great Lakes leaves many of them suspect. The data derived from Voss and Fuller are powerful, and unless met or disproved by later studies, all attempts to perceive in American bogs postglacial climatic rhythms similar to those occurring in Europe stand in danger of collapse—this Sears himself has freely granted.[247]

Cooper has also added geological data which, in relation to certain areas, may have a bearing upon cases of observed aridity in relation to climate. He points out that in many areas drained by the Mississippi and its tributaries, desiccation of the surface soil may have resulted from a lowering of the water-table owing to downcutting by this major

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forests have apparently remained much the same during the last two periods of postglacial forest development."

[242] Voss, 1934, p. 40. In a recent letter Voss indicates his conclusions to be unchanged (Dec. 12, 1937). [243] Sears, 1935, p. 497. [244] Sears, 1937.

[245] Lane's study of the McCulloch bog in Iowa is one of the best known profiles in which reliance is placed on grass pollens. His study purports to show coniferous forest replaced by deciduous, and then prairie which was twice interrupted by waves of amaranthchenapod (semi-arid) vegetation. (Lane, 1931.)

[246] See quotation from Voss, footnote 229, above.

[247] Remarks from the platform at the Symposium on Early Man. Philadelphia, March 17, 1937.

stream. "This hypothesis," he says, "does not exclude the possibility that a period of comparatively dry climate may have been a contributory cause."[248] He insists, however, that in the upper Mississippi area downcutting had a decisive effect on soil aridity whereas there is no direct evidence as to climate. While it is obvious that this geological factor is not applicable everywhere, it is added argument for the necessity of careful geological observation as a necessary complement of all pollen analytical studies and attempted observations on climate derived from locally observed erosion cycles.

If we now turn to a survey of recent European literature we find that attempts to correlate American fluctuations of climate with those of Europe are further complicated by the fact that there is considerable disagreement as to whether the change from the Boreal to the Atlantic period, that is, from dry to wet in northwestern Europe, was a local phenomenon due to geographical conditions in the Baltic or whether it represents a more far-reaching climatic oscillation such as might have extended into North America.

Dr. Brooks, the well-known climatologist, has expressed himself in favor of the view that the so-called Atlantic period is a purely regional oscillation.[249] Antevs has also pointed out that the course of the ice-retreat in eastern North America is not directly comparable at all points with that of Europe. He says, in part, "It seems possible that the early part of the first oscillation in Canada coincided in time with the Fenno-Scandian halts and that the subsequent temperature rise in northern Europe did not affect North America. It is accordingly held that the rapid decay of the European ice after its border had left the Fenno-Scandian moraines was due to the breaking in of the Gulf Stream into the Norwegian Sea. If this be so the border of the Labrador ice may have stood somewhat north of Cochrane when the European ice had shrunk to mere remnants."[250] It is hardly necessary to point out the effect that this dissimilar stand of ice may have had upon the pollen content of peat bogs so far as time of deposition is concerned, even though climatic improvement was essentially the same on both sides of the Atlantic. Thus we arrive inevitably again at the mature

[248] Cooper, 1935, pp. 102–3.

[249] Brooks, 1931*b*. Dr. Erdtmann shares this view saying, "The increase of humidity during the Atlantic period was a consequence of the inundation of wide areas in the southern part of the North Sea and the establishment of a connection with the Baltic." (Erdtmann, 1931*a*.) Clark, 1936, on the other hand, favors Simpson's theory of fluctuations of solar radiation. This, of course, implies world wide changes of a similar nature.

[250] Antevs, 1928, pp. 167–68.

thesis of Auer: that, lacking a fixed point in time, we cannot assume that the same order in Europe and Canada, or in Fuegia, are of exactly the same degree of antiquity.[251] At best, we can postulate a maximum period of postglacial warmth now decreasing and so formulate a generalized scheme along the lines which von Post has suggested. Later it will be possible to discern many regional variations and utilize them archaeologically. That time, however, has not arrived. The necessary data still lie in the ground.

GLACIAL DRIFT AND THE ANTIQUITY OF PEAT BOGS

When we come to consider the Wisconsin ice itself we are forced to take into account the fact that it is very lobate. These lobes, in the opinion of Kay,[252] have resulted from the extension of the ice at somewhat different times from the Labrador, Keewatin and intermediate ice centers, the youngest substage probably reaching its height in Iowa and the Dakotas. Knapp, for example, comments as follows upon the movements of the Wisconsin ice in Minnesota: "In the latest stage (known as the Wisconsin stage) there was one movement into Minnesota, from the northwest, another from the north, and a third from the northeast . . . . These movements were not synchronous in their advance, culmination, and waning, but each had its time of waxing and waning."[253] Schwartz,[254] Cooper[255] and others all substantiate this observation. It is a commonplace of geology. Leverett, in fact, has differentiated as many as five substages, not all covering the same areas. Under such circumstances there can be no certainty that maximum ice conditions along the southern border of the Wisconsin glaciation were everywhere attained at the same time.[256]

The immediate bearing of this fact upon the problems of pollen analysis lies in its significance for the relative datings of postglacial bogs. A bog in the neighborhood of the Wisconsin ice border may lie within the area of one of the late tongues or sub-lobes of the ice, and yet be several thousand years older than the bogs lying upon a later drift in the same general region. Voss has been one of the few pollen specialists to recognize and attempt to deal with this problem.[257] He classified the bogs studied by him according to Leverett's scheme of substages and could find no trace of climatic fluctuation throughout the

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[251] Auer, 1933, pp. 302, 303, 306. [252] Kay, 1931, p. 444.
[253] Knapp, 1923, p. 16. [254] Schwartz, 1936, p. 86. [255] Cooper, 1935, p. 6.
[256] Cooper, *op. cit.*, p. 16. [257] Voss, 1934, 1937*a*; also Hansen, 1937.

entire profiles of the Substage IV bogs.[258] The problem presented by this lack of fluctuation we have discussed in another connection. At this point it is worth noting that unless the relative antiquity of the peat bogs lying upon the various drifts of the Wisconsin ice can be determined, we cannot assume exact contemporaneity of origin.

Too often this geological feature is entirely ignored by the botanist, who fails to give the geological background of the peat area he may be investigating.[259] Thus, in a recent review, we find Richardson protesting,[260] in the case of a peculiarly important site well within the Arctic Circle where clear data might throw a great deal of light on postglacial climate, that there is no attempt to consider the geological problem as to whether the peat is interglacial or postglacial. Such lack of treatment of the features of the geological surroundings and background of the bogs discussed tends to vitiate all conclusions as to their position in the pollen profiles.[261]

It must also be remembered that the Wisconsin ice advanced some ten degrees farther south in America than the Würm in Europe.[264] What this represents in time is somewhat problematical as is also the question of whether forest followed directly on the margin of the retreating ice or whether a period of tundra vegetation represents the first stages of retreat.[265] A subarctic period of tundra is by no means so

[258] Voss, 1934, pp. 39–40.

[259] Thus Oswald, 1935, supplies no information whatsoever of a geological nature. He contents himself with one passing reference to the withdrawal of the ice—a statement which, as we have seen, is much too general a term to be used where the dating of bogs is concerned. Wherever possible, attempts should be made to correlate the peat deposit with a definite substage of the Wisconsin and where this cannot be done the fact should be so indicated. [260] Richardson, 1937.

[261] Thus Voss, at present (1938) working on material from fifty or more bogs from the eastern and northeastern part of the United States writes, "My greatest problem now is that of obtaining the glacial history of the areas involved. In some of our up-to-date states I find that little has been done relative to glacial history while in other states the glacial geologist is sometimes too conservative in voicing his opinions." (Voss, 1937*b*.) A vast battery of geological statements confirms the difficulties of dealing in an exact manner with the more involved fluctuations of the Wisconsin ice. As a single example, de Geer, 1933. [264] Leverett, 1930.

[265] Fuller, *op. cit.*, p. 484. In addition American phytogeographers have encountered some difficulties in mapping and interpreting the transition between eastern deciduous forest and northeastern coniferous forest even at the present time. This feature is worth some consideration in any survey of paleobotanical studies of peat bogs and the fluctuations of climate represented in their pollen remains. See Tansley, 1920. McLaughlin observes that during one of the minor late ice fluctuations in northwestern Wisconsin "the climate was sufficiently mild for the growth of plants within Fox River valley and at

easy to substantiate here as clearly as in Europe. Sears himself comments that "the more northerly bogs are too youthful, and in most of those in the central states the record of early postglacial time is too condensed, if it is present at all."[266]

In connection with the withdrawal of the Wisconsin ice a point made by Godwin must not be forgotten.[267] He dwells on the fact of diffusion which makes the dating of archaeological remains not necessarily the same for all cultures and then adds: "It is possible to demonstrate that in all the sciences to which we have referred in discussing the correlation of the temporal sequences of postglacial time, in geology, climatology, archaeology and pollen analysis alike the same problem of sloping horizon recurs, though nowhere possibly so strongly as in archaeology. There is no simple key to such a problem, but coordinated investigation should finally yield a simple system the internal coherence of which will be a major guarantee of its validity." When the more southward extension of the Wisconsin ice is considered, it is not impossible that when the first southern island glaciers in the Rockies were commencing to retreat and their waters were forming lakes in the lowlands, northern Europe may still have only been experiencing the first faint tinge of climate amelioration. Because of breaks in the deposition of varves in American late glacial lakes, such a chronology as that elaborated by de Geer and his associates for Sweden may never be attained in America.[268] Thus, while it is assumed that the major fluctuations of the ice were synchronous in both the Old and New Worlds, the details present a blurred outline hard to correlate and of almost no value to the archaeologist. Until it becomes possible to establish a time scale of the exactness of de Geer's for the Upper Mississippi region and points east, the floral problems of the surrounding areas will, to a considerable extent, be inexpressible in years. It would be rash at the moment to assume that the climatic fluctuations more or less estimable in years for northern Europe can, with reasonable accuracy, be similarly applied to portions of America where the ice retreat began 20,000 or 25,000 years ago,

Two Creeks . . . along the Lake Michigan shore. It seems quite certain, therefore, that there were even trees of considerable size . . . before the ice had withdrawn for the last time." (McLaughlin, 1932.) See also Voss, 1937*a*, p. 132. Flint insists that "Vegetation returned abundantly to the Connecticut region while ice still occupied the major valleys." (Flint, 1930.)

[266] Sears, 1935. Bryan, 1928, has also commented that "The extensive and unbroken plains which lay to the south of the ice in the interior United States allowed a free sweep of winds from the Southwest and may have limited the zone of periglacial climate to a very narrow strip." [267] Godwin, 1934, p. 350. [268] Flint, 1930; de Geer, 1933.

possibly with very little tundra intervening. The caution of Godwin in regard to the sloping nature of all such indices should not be forgotten, at least until such time as we can definitely establish that all minor climatic movements in postglacial time are solar in origin and world-wide in extent. There are data pointing in this direction, but it would not be possible to eliminate the regional character of much climatic movement in any case. Even after the successful establishment of a world theory of climate one would still have to distinguish the local from the universal. In this connection it is perhaps worth noting that so prominent a climatologist as Brooks has said: "The material is insufficient to establish the existence of systematic world-wide rhythms or pulsations of climate."[269] The fact that this was a comment made in repudiation of an earlier volume in which the author advanced such theories is an added commentary upon the state of confusion at present existing in this field.

POLLEN AND THE AREAL DISTRIBUTION OF THE FOLSOM COMPLEX

For the purposes of this paper which are essentially botanical, there is no necessity for launching into a long discussion of the typological evolution of Folsom and Yuma artifacts. This is a problem which only more work in the field is likely to solve. We may observe, however, that generally speaking late studies reveal this cultural complex as widely distributed over the United States.[270] Nevertheless, all of those finds actually made *in situ* in association with extinct species of animals have, to date, been made in the region of the high plains and the southwestern United States.

Cotter has shown that from this area "the occurrence of these implements diffuses and diminishes in every direction."[271] The focal point at present seems to lie in this region and by far the greater number of known specimens comes from here. There are a few scattered artifacts reported from the east, but they represent surface finds of an undatable nature. Either the erosion of the loess mantle in the western areas is bringing more sites to our attention or the penetration of the Folsom people eastward in any numbers must have taken place comparatively late. At any rate the Folsom complex does not appear so much a forest culture, as one adapted to the great bison area of the west. This statement is in no wise intended to be dogmatic or to minimize the eastern occurrences of Folsom artifacts. It is not impossible that genuine habita-

[269] Brooks, 1931*a*. [270] Cotter, 1935; Howard, 1935.

[271] *Op. cit.*, p. 88. See also Howard, *op. cit.*, p. 119.

tion levels may someday be found within the forest areas. It cannot be denied, however, that compared with the types of erosion common to the high plains, the eastern woodland offers few possibilities that are likely to affect this conclusion. Of these few, the chances of discovering a site in the actual layers of a peat bog are even more negligible. It is not commonly remembered that one of the major reasons why fairly accurate correlations of archaeological with botanical data are possible for such a large section of middle and northern Europe lies in the nature of at least one of the cultures concerned. Yet such is the case—and to date our native cultures show no precisely similar development.

A large number of important sites representing period II (Boreal) on the Blytt-Sernander scale are settlements, apparently seasonal, on islands or other refuge spots in the midst of the bogs which during this period were so extensive over the whole north European plain.[272] Of these, the most typical culture is that known as Maglemose. Its possessors were dominated by a fishing and fowling economy and lingered in places which made the dating of their culture peculiarly approachable through pollen analysis. One can readily recognize the advantages of their peculiar type of economy to the archaeologist when one considers the hiatus in our knowledge of their winter life. Archaeological information fails us whenever they leave the fens which they frequented during the summers.[273]

It is thus obvious that only the peculiar and local circumstance of a bog culture associated with an area thick in peat bogs and submerged fens has really made possible such an extensive correlation of archaeological horizons with climatic fluctuation. It is true that other cultures have been successfully fitted into this scheme, but only because of culture sequences which can be related to the Maglemose tradition or correlated with such an important geological phenomenon as the Litorine Transgression. Faunal successions are also observable. For cultures not associated with the fens, pollen remains, at best, of indirect assistance only as it bears upon the dating of cultures related to those in other areas.

This divergence from our central topic has been made to emphasize the peculiar advantage enjoyed by the European archaeologist in his employment of the pollen analytical method. The region where most of the investigated American bogs occur, namely in eastern Canada and the eastern woodland of the United States has, to date, supplied no

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[272] Clark, 1936, p. 41. [273] *Ibid.*, p. 90.

such human traces as provide a fixed point in time for our contemplation of the postglacial activities of man in the New World. Whatever fluctuations of climate they reveal remain meaningless in terms of human occupation.[274] One can only regret, with a reserved hope for the future, that the men who left the remains of their remarkable lithic industry so thickly scattered in the dead lake basins of the Southwest, did not leave similar fragments in the peat of the Ohio bogs.

If we now survey that area in which our oldest culture seems definitely recognizable, we come to the added realization that the pollen analytical method seems altogether inapplicable—not so much because it is in an embryological state of development as because of the lack of necessary successions of preserved pollen. It is true that attempts have been made by archaeologists impressed with the chronologies developed by Sears in the eastern woodland to secure such material from the sites of the high plains, but each attempt has ended in total failure. It has failed at Signal Butte,[275] at Clovis,[276] and at Ft. Collins.[277] Van Royen has sought tentatively to correlate the vegetation bands of the Cape site with Sears' periods in Iowa.[278] This, lacking pollen, lacking the demonstration of the continuity of these vegetation bands over wide areas, lacking also the definite assurance of Sears that we are yet justified in checking Lane's Iowan successions with observed fluctuations in the Ohio bogs,[279] can but remain, at best, a highly theoretical structure. In the region of the high plains there has been as yet no work of a pollen analytical nature which will stand severe critical examination in so far as the dating of temporally remote cultures is concerned.

The work of Gleason[280] is of peculiar importance in this regard. After

[274] In this connection it is interesting to note such an experienced European specialist as Auer complaining that "the solving of this problem is rendered more difficult firstly as there are in Canada no archaeological facts to go by,"—an apt revelation of the influence of prehistory on the development of the pollen technique in northern Europe! (Auer, 1927, p. 24.)

[275] Strong, 1935, pp. 237–39. It is true that some attempt is made to correlate certain of the cultural horizons with climatic fluctuation in Iowa, but at present the results are not particularly convincing in view of the difficulties which we have reviewed—a fact with which Dr. Strong has indicated his hearty agreement. It must be emphasized that no pollen was derived from the soils at this site. The same remarks apply to the Cape site described by Bell and Van Royen, 1934. For added comment on the Cape site, see also MacClintock, 1935.

[276] Howard, 1935, p. 88. [277] Roberts, 1936, p. 4. [278] Bell and Van Royen, *op. cit.*

[279] Sears, 1932*b*, p. 4. "The exact relationship of those two periods of apparently semi-arid climate [in Iowa] to the changes in Ohio cannot be settled until further work is done."

[280] Gleason, 1922.

an exhaustive survey of the botanical data bearing upon the possible floral successions in this area, he emphasizes conclusions which present great difficulties to any correlation through pollen statistical methods west of the Des Moines lobe of the Wisconsin ice.[281] It is, he observes, "doubtful if any conifers or associated species occurred west of this lobe."[282] The eastern floral successions beginning with the conifers and passing into deciduous forest which yield the pollen changes upon which pollen statistics are primarily based, both in America and abroad, fail us completely upon the high plains. The xerothermic warm and dry period of climate which Gleason postulates brought about an eastern migration of prairie which greatly restricted the boreal flora in the west.

Gleason comments, in addition, that ponds abundant on the Wisconsin drift fifty years ago in Illinois, were notable for the lack of several types of hardy boreal plants.[283] Moreover they were "characterized by the absence of deep peat deposits, indicating that they had never been occupied by boreal vegetation and were of comparatively recent origin."[284] The figures of actual peat distribution, such as quoted by Auer[285] and others are, particularly toward the southwestern angle of the Wisconsin glaciation, far in excess of the actual distribution of deep peat. The peculiar climatic conditions which contributed to the elimination of the usual floral relicts along the western curve of the Wisconsin ice border have apparently greatly limited, if not nullified, the possibilities of the pollen analytical method throughout the entire high plains. When it is considered, for example, that well over a hundred pollen grains per sample[286] are necessary in order to lower the percentage of error and offset local influences, the chance of obtaining sufficient samples seems scant indeed. Even granting the possibility of fragmentary data from a few individual sites, only data over a wide area can enable us to distinguish between local vegetational succession[287] and widespread change brought about by a fluctuation of climate. Since in ordinary soils pollen is quickly destroyed by fungi, and survives

[281] Auer, 1927, points out that within continental areas the filling up of lakes in poorly drained regions is one of the principal causes of peat formation. It is obvious that such conditions do not obtain westward in the United States save in a few quite recent and transitory cases.

[282] *Ibid.*, p. 65.

[283] Bogs are particularly characterized by relict plant communities.

[284] Gleason, 1922, p. 70.

[285] Auer, 1930.

[286] Erdtmann, 1931*b*.

[287] Hansen, 1937, indicates that it is not impossible for a forest fire to bring about local ecological changes which would tend to duplicate the appearance of a xeric period.

only under the acid conditions obtaining in bogs, or in alkaline fen peats,[288] the prospects for such remains as have been sought in the plains area and elsewhere seem amazingly slight. The only hope that the pollen analytical method seems definitely to offer is the possible chance of correlating western artifacts with eastern finds which may later be dated by this method. At present, bearing in mind the doubts of Voss, Cooper, and even Sears, it seems wise to leave the whole method to a space of disciplined development at the hands of its proponents.

CONCLUSION

After the somewhat critical survey of the uses of the pollen analytical method in America which we have just completed, it may appear that the writer entertains but little faith in its use. Actually this is not the case. Potentially it promises a great deal, for there can be little doubt that, as has been amply demonstrated for Europe, postglacial climate has fluctuated. The question remains, however, whether we are as yet justified in assuming exactly synchronous movements on both continents. As Sears and others have pointed out, the usefulness of any scale which we may devise really depends on further intensive regional studies and, eventually, regional correlations. Sears has made, almost single-handed, an enviable start in this direction, but his detailed fluctuations have not been substantiated by the work of Fuller and Voss in the Lakes region. We are therefore forced to suspend judgment beyond the somewhat tentative observation that Lennart von Post's generalized scheme of a period of increasing warmth, of maximum warmth and of decreasing warmth seems capable of substantiation up to a certain point.

The recent timberline studies of Dr. Griggs constitute the latest caution on the subject of world climatic rhythms. After long study he observes, "The stability of timberline in the Rocky Mountains, coupled with rapid advance in western Alaska and evidences of increasing cold in northeastern Canada, afford, I think, an important insight into the character of climatic changes in general. In common with most others I used to suppose that the great climatic changes indicated in geologic times were world-wide in scope. Conditions here in North America make it clear that shifts in climate of sufficient magnitude to become of geological significance are not necessarily even continental in extent but may occur in much smaller areas. It will be recognized that this greatly simplifies the problem of accounting for such things as ice

[288] Newbigin, 1936, pp. 68, 84.

'ages' since it may involve merely a redistribution of the heat and rain received by the earth rather than variations in the total amount."[289]

Thus Griggs tends to regard the observed historic warmth maximum enjoyed by the Norse colonies in Greenland as a local climatic "exchange" rather than a world phenomenon.[290] The northward movement of forest in Alaska contrasted with the seemingly southward withdrawal of conifers in the east tends strongly to substantiate this viewpoint.

The fact, however, that climatic fluctuation may have to be dealt with regionally does not necessarily destroy the usefulness of pollen profiles. The conclusion is inescapable, however, that if variation should prove totally or even largely of such a nature the complications would be great. Much care would need to be exercised to avoid fitting similar fluctuations into *hypothetically* similar time scales.[291]

Quite recently, Sears has announced the discovery of pollens preserved in alluvial deposits under semi-arid conditions in the Southwest. Lack of details makes extended comment on these discoveries inadvisable. It may be observed, however, that from the standpoint of technology it is difficult to believe that these soil zones are likely ever to supply pollen in amounts sufficient to eliminate the probability of error[292] to the same degree as peat bogs, or to obtain such unbroken sequences upward. Again, the problem of edaphic change must be decided, and the great distance from the ice front also implies some difficulty in establishing a satisfactory datum point. The relative ability of these alluvial deposits to catch wind-blown pollen as satisfactorily as bogs, as well as the effect of seasonal drying—all of these items suggest difficulties, at least for a long time to come, in correlating the data so gathered with fluctuations in the peat layers northward.[293] At best we may hope to derive information suggestive of the great Pluvial of Antevs. It would be rash, however, too hastily to fit isolated vegetation bands, however interesting, into other than local successions. The remaining picture of the pollen problem as seen at present is one of vast interest and amazing complexity, its future promise shadowed only by ill-advised enthusiasm. A long period of endeavor in the field, not merely

[289] Griggs, 1937. [290] *Ibid.*, p. 252.

[291] Auer, 1933, p. 303 seems fully alive to this danger.

[292] Barkley, 1934, discusses certain of the mathematical problems of pollen analysis.

[293] Adams, 1902, has suggested that the great amount of endemism in both flora and fauna in the Southwest indicates that its present arid condition, at least partially, may have endured for a considerable period of time and extended well into the Pleistocene. Griggs, 1937, p. 254, also gives it as his opinion that the flora of the Southwest has remained static for a long period.

at archaeological sites of importance, but at all points likely to yield correlative information, is the only procedure which promises to give us anything equivalent to the development of the pollen analytical method in Europe.

REFERENCES

ADAMS, C. C.
1902. The Southeastern United States as a Center of Geographical Distribution of Flora and Fauna. Biological Bulletin, 3.

ALLEN, G. M.
1919. The American Collared Lemmings, Dicrostonyx. Bulletin of the Museum of Comparative Zoölogy, Harvard, 62: No. 13.

ANTEVS, ERNST.
1928. The Last Glaciation. American Geographical Society Research Series No. 17.

AUER, VAINO.
1927. Stratigraphical and Morphological Investigations of Peat Bogs of Southeastern Canada. Helsinki.
1930. Peat Bogs in Southeastern Canada. Canadian Geological Survey, Memoir 162.
1933. Verschiebungen der Wald und Steppengebiete Feuerlands in postglacialer Zeit. Acta Geographica, Helsingfors, 5.

BARKELEY, F.
1934. The Statistical Theory of Pollen Analysis. Ecology, 13.

BELL, E. H. AND WILLEM VAN ROYEN.
1934. An Evaluation of Recent Nebraska Finds Sometimes Attributed to the Pleistocene. Wisconsin Archaeologist, N.S., 13.

BERRY, EDWARD W.
1912. Notes on the Present Status of Paleobotany. The Plant World, 15.

BLAKE, I. H.
1926. A Comparison of the Animal Communities of Coniferous and Deciduous Forest. Illinois Biological Monographs, 10.

BLYTT, A.
1882. Die Theorie der wechselnden kontinentalen und insularen Klimate. Bot. Jb. 11.

BROOKS, C. E. P.
1931*a*. Changes in Climate in the Old World during Historic Time. Quarterly Journal of the Royal Meteorological Society, 57.
1931*b*. The Correlation of Pluvial Periods in Africa with Climatic Changes in Europe. Appendix B in Leakey, L. S. B. The Stone Age Cultures of Kenya Colony, Cambridge.

BRYAN, KIRK.
1928. Glacial Climate in Non-Glaciated Regions. American Journal of Science, 16.
1932. Paleoclimatology in North America as a Result of the Study of Peat Bogs. Zeitschrift für Gletscherkunde, 20.

CLARK, J. D. G.
1936. The Mesolithic Settlement of Northern Europe. Cambridge University Press.

COOPER, WILLIAM S.
1935. The History of the Upper Mississippi River in Late Wisconsin and Post Glacial Times. Minnesota Geological Survey, Bulletin 26.
COTTER, J. LAMBERT.
1935. Folsom and Yuma Artifacts. Master of Arts Thesis, University of Colorado.
COWLES, H. C.
1928. Persistence of Prairies. Ecology, 9.
DACHNOWSKI-STOKES, A. P.
1921. Peat Deposits and their Evidence of Climatic Changes. Botanical Gazette, 72.
1922. The Correlation of Time Units and Climatic Changes in Peat Deposits of the United States and Europe. Proceedings National Academy of Science, 8.
1935. Peat Land as a Conserver of Rainfall and Water Supplies. Ecology, 16.
EISELEY, L. C.
1937. Index Mollusca and their Bearing on Certain Problems of Pre-history: A Critique. Twenty-fifth Anniversary Studies, Philadelphia Anthropological Society, University of Pennsylvania Press.
ERDTMANN, G.
1931*a*. The Boreal Hazel Forests and the Theory of Pollen Statistics. Proceedings, Fifth International Botanical Congress, Cambridge.
1931*b*. Pollen Statistics; A New Research Method in Paleo-ecology. Science, N.S., Vol. 73.
ERDTMANN, G., AND H. ERDTMANN.
1933. The Improvement of Pollen Analysis Technique. Svensk. Bot. Tidskrift, 27.
FERNALD, M. L.
1935. Critical Plants of the Upper Great Lake Region of Ontario and Michigan. Rhodora, 37
FLINT, R. F.
1930. The Glacial Geology of Connecticut. Geological and Natural History Survey of Connecticut. Bulletin 47.
FULLER, G. D.
1935. Post Glacial Vegetation of the Lake Michigan Region. Ecology, 16.
DE GEER, GERARD.
1933. International Geo-chronology; Its Origin and Scope. Pan American Geologist, 60.
GILES, A. W.
1930. Peat as a Climatic Indicator. Bulletin Geological Society of America, 41.
GLEASON, H. A.
1922. The Vegetational History of the Middle West. Annals of the Association of American Geographers, 12.
GODWIN, H.
1934. Pollen Analysis: An Outline of the Problems and Potentialities of the Method, Part II. The New Phytologist, 33.
GRIGGS, ROBERT F.
1937.Timberlines as Indicators of Climatic Trends. Science, N.S., 85.
HANSEN, H. P.
1937. Pollen Analysis of two Wisconsin Bogs of Different Age. Ecology, 18.

HOWARD, EDGAR B.
1935. Evidence of Early Man in North America. University of Pennsylvania Museum Journal, 24.
HUTCHINSON, A. H.
1918. Limiting Factors in Relation to Specific Ranges of Tolerance of Forest Trees. Botanical Gazette, 66.
KAY, G. F.
1931. Classification and Duration of the Pleistocene Period. Bulletin of the Geological Society of America, 42.
KNAPP, G. N.
1923. The Foundry Sands of Minnesota. The Minnesota Geological Survey, Bulletin No. 18.
LAGERHEIM, G.
1905. Stratiotes aloides L. funnen i Sveriges post glaciala aflagringar. Geol. Foren., Stockholm, Förh, 27.
LANE, G.
1931. A Preliminary Pollen Analysis of the East McCulloch Peat. Ohio Journal of Science, 31.
LEE, S. H.
1924. Factors Controlling Forest Succession on Lake Itasca, Minnesota. Botanical Gazette, 78.
LEVERETT, FRANK.
1930. Problems of the Glacialist, Science, N.S., 71.
LEWIS, I. F. AND E. C. COCKE.
1929. Pollen Analysis of Dismal Swamp Peat. Journal of the Elisha Mitchell Society, 45.
MACCLINTOCK, PAUL.
1935. Investigation of the Geology of the Yuma-Folsom Sites in Western Nebraska. Carnegie Institution Yearbook, Number 34. Washington.
MCLAUGHLIN, W. D.
1932. Atlantic Coastal Plain Plants in the Sand Barrens of Northwestern Wisconsin. Ecological Monographs, 2.
NEWBIGIN, MARION I.
1936. Plant and Animal Geography. London, Methuen and Company.
OSWALD, H.
1935. A Bog at Hartford, Michigan. Ecology, 16.
VON POST, L.
1931. Problems and Working Lines in the Post-Arctic Forest History of Europe. Fifth International Botanical Congress, Cambridge University Press.
RICHARDSON, F. L. W., JR.
1937. Review of R. G. Fisher, The Relation of North American Prehistory to Postglacial Climatic Fluctuations (1935). AMERICAN ANTIQUITY, Vol. II.
RIGG, GEORGE B.
1916. A Summary of Bog Theories. Plant World, 19.
ROBERTS, F. H. H., JR.
1936. Additional Information on the Folsom Complex. Smithsonian Miscellaneous Collections, 95.

SCHWARTZ, GEORGE M.
1936. The Geology of the Minneapolis-St. Paul Metropolitan Area. Minnesota Geological Survey, Bulletin No. 27.
SEARS, PAUL B.
1932*a*. Archaeology of Environment in Eastern North America. American Anthropologist, Vol. 34.
1932*b*. Postglacial Climate in Eastern North America, Ecology, 13.
1935. Types of North America Pollen Profiles. Ecology, 16.
1937. Pollen Profiles in the United States as an aid in Dating Cultural Deposits Early Man, ed. G. G. MacCurdy, Lippincott.
1938. Climatic Interpretation of Postglacial Pollen Deposits in North America Bulletin of the American Meteorological Society, 19.
SEARS, PAUL B., AND ELSIE JANSON.
1933. The Rate of Peat Growth in the Erie Basin. Ecology, 14.
SERNANDER, R.
1908. On the Evidence of the Postglacial Changes of Climate Furnished by the Peat Mosses of Northern Europe. Geol. Foren., Stockholm, Förh, 30.
SEWARD, ALBERT.
1931. Plant Life Through the Ages. Cambridge University Press.
SOPER, E. K.
1919. The Peat Deposits of Minnesota. Minnesota Geological Survey Bulletin No. 16, Minneapolis.
STRONG, W. D.
1935. An Introduction to Nebraska Archaeology. Smithsonian Miscellaneous Collections, 93.
TANSLEY, A. G.
1920. Two Vegetational Maps of the United States. Journal of Ecology, 8.
TRANSEAU, E. N.
1935. The Prairie Peninsula. Ecology, 16.
VOSS, JOHN.
1934. Postglacial Migration of Forests in Illinois, Wisconsin, and Minnesota. Botanical Gazette, 96.
1937*a*. Comparative study of Bogs on Carey and Tazewell Drift in Illinois. Ecology, 18.
1937*b*. Letter to the author, December 12, 1937.

CERAMIC STRATIGRAPHY IN A GEORGIA VILLAGE SITE

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THIS paper is limited to the presentation of the stratigraphic relationships of certain pottery types which are found in a pre-historic village site in central Georgia. These types are site markers of two established cultural horizons in the southeast, and it is evident that their wide distribution and relationships to the chronological framework of the area are of major archaeological importance. In a recently published report of investigations centering in and around Macon, Georgia, A. R. Kelly demonstrates that the Lamar and Swift Creek horizons are differentiated from each other and from other cultural complexes in the region by distinctive traits.[295] Foremost among these traits, for each complex, is pottery.

The relative time positions of Lamar and Swift Creek in the Macon chronology were suggested by Kelly as early as 1936. These estimations were based upon typological factors as seen in the pottery, and upon the presence of intrusive "Mississippian" influences in the Lamar horizon in general.[296] These influences were lacking in Swift Creek. The similarity between pottery of the Ocmulgee Fields, the historic period at Macon, and the Lamar, suggests a late and direct development into the European contact period.[297]

One known site in the central Georgia area excavated in 1936, shows ware types and other artifacts implying occupation by both Lamar and Swift Creek groups, but laboratory results on this material have not yet been made available. At Cowart's Landing, in the winter of 1937, evidence of superposition was obtained. This was done by using sherd types in stratigraphic comparisons.

Cowart's Landing is a village site about eleven miles below the city of Macon on the west side of the Ocmulgee River, and about a mile

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[294] Archaeologist, Ocmulgee National Monument (CCC) in 1937–38.

[295] Kelley, A. R., A Preliminary Report on Archaeological Explorations at Macon, Georgia. Anthropological Papers, No. 1, Bulletin 119, Bureau of American Ethnology, Washington, 1938, pp. 25–31.

Jennings, J. D., Recent Excavations at the Lamar Site, Ocmulgee National Monument, Macon, Georgia. Mimeographed publication, Ocmulgee National Monument, Macon, Georgia, 1939. (Jennings suggests a tentative alignment of the Swift Creek and Lamar cultural horizons within the "Midwestern Taxonomic Scheme." Swift Creek is described as an early aspect of the Woodland pattern. Lamar is considered a focus embodying both Mississippi and Woodland pattern traits.)

[296] Kelly, A. R., *Op. cit.*, pp. 47–48. [297] Kelly, A. R., *Op. cit.* pp. 56–57.

above the junction of Tobesofkee Creek with the Ocmulgee. Several other sites in the immediate vicinity indicate that the river valley and its tributaries were thickly populated in prehistoric times.

The site under consideration occupies an ancient river terrace, bordered on the east, for a quarter of a mile, by swampland which extends down to the normal banks of the river. On the west of the site is a high, sloping bluff. The elevated terrace extends east from the foot of the bluff, to the swamp, for about one hundred and seventy-five yards. Sherds and other materials are found the full width of the terrace and along a north-south axis for approximately three hundred and fifty yards.

Surface collections made at random gave indications of both Lamar and Swift Creek occupations. Subsequent collections recorded from mapped and plotted hundred-foot circles showed more interesting results. Lamar sherds blanketed the site; Swift Creek sherds were found only in restricted areas. The possibilities of temporal differences, being expressed by this horizontal segregation, were followed up with excavation.

Excavation was carried out by sinking test pits ten feet square in the vicinities where both Lamar and Swift Creek sherds were found. All material was catalogued by arbitrary three inch levels. Physical profiles were drawn on completion of the cut for comparison with the arbitrary levels.

Average soil profiles on the site revealed a plough-disturbed top stratum of mixed residual sands and organic matter about six to nine inches deep. The line of demarcation between this and the immediately underlying midden layer was fairly distinct. The latter, in most instances, was over a foot thick, and was not separated so clearly from the underlying loam. Between the black midden soil and the bright red undisturbed subsoil was a zone of twelve to fifteen inches in which the color of the overlying midden faded from top to bottom, to a reddish gray and blended into the undisturbed subsoil. This transitional zone appears to have been the old ground surface. A few sherds and flints were found in this strata. These conditions seemed to be quite uniform for the site. Roots, probable post moulds, small refuse pits, and grave areas broke through from the midden level in many places into the clean loam and clay below. No consistent, clean-cut discontinuity, however, was seen in the occupation stratum, and from examination of the soil profiles no physical stratigraphy was determinable.

Sherd types of both horizons were recovered in test pits. No types,

other than those represented in the surface collections, were found, although, in relationship to Lamar, Swift Creek percentages increased. The arbitrary levels showed some evidence of percentage stratigraphy that would indicate the temporal priority of Swift Creek in relation to Lamar. These figures, however, were not conclusive. Obviously, pits, roots, postmolds and other intrusive features had disturbed the natural midden deposits to such an extent that artificial three-inch levels would not give a true time-depositional picture. The thin zones were obviously cutting through mixtures of early and late refuse. The problem was complicated, moreover, by the fact that the detritus layer was relatively thin, only fifteen to twenty inches deep, and probably had also been torn up by the normal village activities of the former inhabitants. Furthermore, small disturbances or intrusions, while showing up well enough below the occupation line in the red loam, could not be detected and eliminated from the black midden to guarantee accuracy by the usual stratigraphic procedures.

To correct this, a technique was employed whereby each sherd was plotted in relation to the soil strata and to other sherds. This was done in the usual manner, isolating a block for stratigraphic purposes by cutting a narrow trench on the four sides of a ten foot square. Beginning on one face, the soil profiles were recorded and then a one-foot strip the length of the block, was peeled down from the top. Each sherd was located exactly as to the depth and as to the horizontal position in the long axis of the strip. A maximum of twelve inches of error was allowed for the other horizontal position in the short axis. The entire test block was taken down in this manner. Examples of the stratigraphic records are illustrated in the accompanying charts.

Although intrusions in middens could not be detected visibly, it can be seen on the sherd-plots that there are small, localized areas in which both Lamar and Swift Creek materials were thoroughly mixed. As these same charts show convincing numbers of scattered Swift Creek sherds underlying Lamar Types, it is safe to assume that these mixtures represent intrusions of later into earlier refuse. In addition to this, two successive plotted excavation strips of a block showed a small refuse accumulation filled with Swift Creek period sherds lying below the general level of the midden in which Lamar and Swift Creek types were intermingled. There are no evidences which would suggest that this refuse was intrusive.

On this stratigraphy it can be pointed out that the Swift Creek horizon is older than the Lamar in the Ocmulgee basin. Considering the

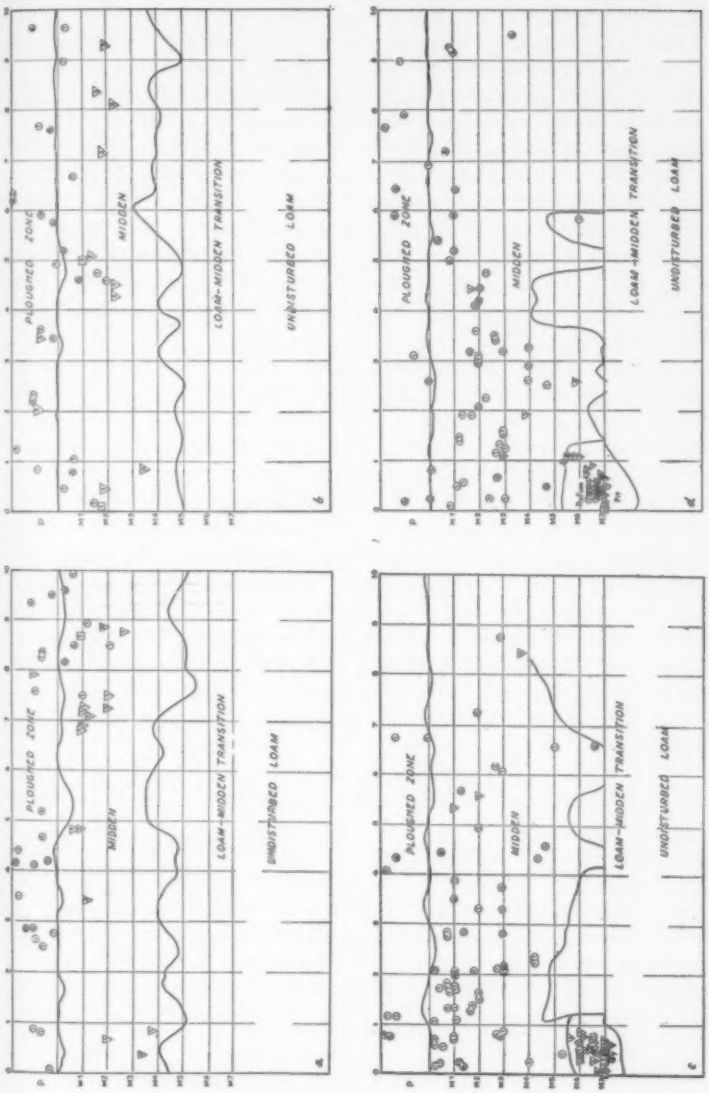

FIG. 4.—Charts showing soil profiles of ten-foot stratigraphic blocks.

wide areal extent of both, and the fact that they are at present recognized principally upon the appraisal of pottery traits, it is possible that studies in widely separated areas may show variance in chronology.

In the charts illustrated in Figure 4, the vertical scale is double that of the horizontal. Heavy lines bound soil zones; light lines are arbitrary three-inch levels. Lamar sherds are represented by circles, Swift Creek, by triangles. Sherds belonging to minority percentage types in the Swift Creek pottery complex are shown as squares. Indeterminate sherds are marked as ovals. The small numbers within the symbols stand for the various types and sub-types within each complex, but are not significant for the purposes of this paper. Charts *a* and *b* are from the same block but are not contiguous; charts *c* and *d* are contiguous slices of another block.

The pottery of these periods has certain distinguishing features. Lamar is characterized by two principal decoration techniques; stamped patterns, probably made with a paddle, to which the name Lamar Complicated Stamped has been given, and deep grooving or incising designated as Lamar Bold Incised. Both techniques are applied to the vessel exteriors before firing. The stamped designs are mainly curvilinear, but have some rectilinear elements. Overlapping concentric circles, the fylfot cross, round solid dots or blobs are all typical. The depth of impression is not great and the lines forming the patterns of design are closely spaced and not too distinct. Execution is often careless, and overlapping is common in the application of the stamp.

The deep line incising of Lamar Bold Incised forms circles, meanders, and scrolls around the upper portions of medium-shallow casuelas or carinated bowls. Small punctations may accompany the incising as a background to incised designs. A row of hollow reed punctates usually forms a lower border for the incising. The complicated stamped decorations may, or may not, appear on the bottom of a bowl which has the incised paneling.

Medium-shallow casuela bowls with inturned sides, sharp shoulders and direct rims represent the most common vessel shape found in connection with the type, Lamar Bold Incised. Deep cauldrons with rounded or semi-conoidal bases, slightly insurged sides, out-turned rims with flattened or slightly ovate lips, and folded or thickened pinched rims, are common features of Lamar Complicated Stamped. Occasionally, hollow reed punctations have been substituted for the pinching in the treatment of the rim.[298]

[298] Observations on vessel shape have been deduced from comparative Lamar ma-

Lamar ware apparently is coiled. Paste is medium granular in cross-section, and the usual temper comprises mixed coarse grit and sand. Temper is only moderately abundant. Hardness is 4. The exterior surface is usually covered with a stamped decoration, but the interiors are smoothed. Wall thickness will average 8 mm., with bases thicker and rims thinner. At Cowart's Landing, cross-section color is reddish-buff and grey. Exteriors are usually grey or black.[299]

Some plain ware considered Lamar because of paste and surface finish was found. In many cases it was difficult to distinguish whether the surface was actually plain or whether very faint paddle stamping had been applied. A "smoothed" plain variation may have been represented by plain fragments of vessels bearing the deep line incising. However, only the two horizons were clearly stratified on the site, and within the Lamar horizon no stratification of individual types was observed.

Plate X, Figure 1, illustrates a panel of sherds of the Lamar horizon; sherds *a*, *b*, and *c* are Lamar Bold Incised; *c* shows background of small punctates; *e* is a thickened and pinched rim, a characteristic treatment for the type Lamar Complicated Stamped. Sherds *d*, *f*, *g* and *h* are Lamar Complicated Stamped.

Swift Creek is marked by a distinctive stamped pottery characteristic of that horizon, Swift Creek Complicated Stamped. It has a paddle or die stamped decoration which takes a great number of curvilinear and some rectilinear forms. The impressions are quite deep, well formed, and the lines making up the various elements and motifs are well spaced. In most of these characteristics it differs from Lamar Complicated Stamped. Execution is carried out with a sureness that surpasses any of the Lamar decorations. The incised technique is not used in conjunction.

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terial from the Lamar site, although, rim forms from Cowart's Landing bear out the assumptions.

[299] Kelly, A. R., *Op. cit.*, pp. 46–50, pl. 12a.

Holmes, W. H., Report on Aboriginal Pottery of the Southeastern United States. Twentieth Annual Report of the Bureau of American Ethnology, Washington, 1903, pp. 131–134.

Jennings, J. D., and C. H. Fairbanks, Southeastern Archaeological Conference Newsletter (Mimeo.) Vol. 1, No. 2, 1939. (Since this manuscript was originally submitted, a thorough description of Lamar Complicated Stamped and Lamar Bold Incised has been circulated as a mimeographed publication.)

Moore, C. B., Certain Aboriginal Mounds of the Georgia Coast. Philadelphia Academy of Natural Sciences, Second Series, Vol. XI, Part I, 1897 (Vessels on pls. IX and X show design and shape similarities to both Lamar types.)

Shape evidence is doubtful, but indicates deep pots with conoidal bases, and straight or slightly outslanting walls. Rims are direct, or have exterior folds which show a great deal of variation in size.

Paste is fine and granular in cross-section. Fine grit and sand are used as temper. There is interior smoothing that approaches polishing. Color is uniformly buff to reddish-buff for both cross-section and surface. Vessel exteriors are virtually covered with stamped decorations. At Cowart's Landing, a similar plain ware occurs in percentages equal to the stamped. It is readily distinguished from plain Lamar sherds on the basis of paste and surface texture.[300]

In association with these types there are at Cowart's Landing, as at other Swift Creek sites, a number of types which characteristically occur with Swift Creek Complicated Stamped in minority percentages. These have been referred to under the tentative names of Napier Complicated Stamped; Vining Simple Stamped,[301] steatite ware and St. Simon's Fibre-Temper Plain.[302] Their descriptions will not be included in this article. As has been brought out in previous literature, and by subsequent research, they form a small group usually to be expected in the Swift Creek pottery complex, in the Ocmulgee basin. Their exact time position in relation to Swift Creek is not known, but they are absent in later horizons such as Lamar.

In Plate X, Figure 2, several of these types are illustrated. Sherds *a–g* are Swift Creek Complicated Stamped; *h* is Vining Simple Stamped (Mossy Oak Simple Stamped), *i*, St. Simon's Fibre-temper Plain, *j*, an indeterminate stamped sherd, and *k*, a plain rim sherd of the Swift Creek type.

[300] Kelly, A. R., *Op. cit.*, pp. 27–29, Pl. 11a.

Holmes, W. H., *Op. cit.*, pls. LXXXVII and LXXXVIII.

Moore, C. B., Certain Aboriginal Remains of the Northwest Florida Coast. Philadelphia Academy of Natural Sciences, Second Series, Vol. XII, Part 2, 1902. (Numerous sherds and vessels which show relationship to Swift Creek Complicated Stamped on the basis of design.)

Jennings, J. D., and C. H. Fairbanks, *Op. cit.*, Type description of Swift Creek Complicated Stamped.

Haag, W. G., Southeastern Archaeological Conference Newsletter (Mimeo.) Vol. 1, 1939. (Swift Creek Complicated Stamped and Pickwick Complicated Stamped show design similarity.)

[301] Jennings, J. D., and C. H. Fairbanks, *Op. cit.*, type description of Mossy Oak Simple Stamped, formerly Vining Simple Stamped.

[302] Kelly, A. R., *Op. cit.*, (Kelly discusses these types on pp. 22, 30–31, and 58–60.)

FIG. 1.

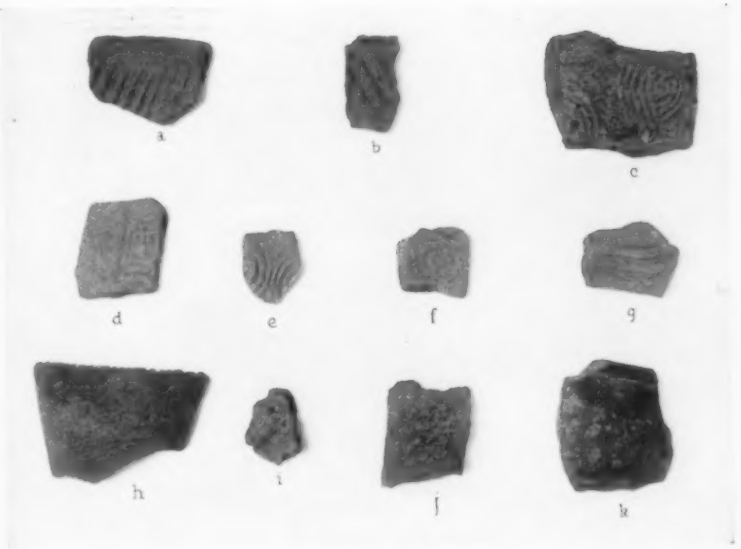

FIG. 2.
Sherds from the Cowart's Landing Site.

In several instances the descriptions of Swift Creek and Lamar types have been augmented by the writer's knowledge of collections from other sites. This is particularly true for vessel shape criteria. However, features which occur in the pottery of these two horizons elsewhere, and were not recorded at Cowart's Landing, have not been mentioned here.

The stratigraphic contact demonstrated is offered as proof that the Swift Creek pottery horizon is beneath and earlier than the Lamar pottery horizon. This is borne out by the results of several test excavations, some of which have been described. These conclusions were arrived at by inspection of the charts compiled from field and laboratory data. This chronological information concerning the relationship of the Lamar and Swift Creek periods, should be of value in future studies in the central Georgia region.

FACTS AND COMMENTS

MASTODON BONE WITH ARTIFACTS IN CALIFORNIA

The complete lower jaw of a Mastodon was found a number of years ago in "Pleistocene" gravels several miles from Bitterwater, San Benito County, California. When this locality was visited a few weeks ago by a field party from the Museum of Paleontology, University of California, a confusing "association" of Proboscidean bones and recent utensils was observed. Near the top of a cross-bedded deposit of gravel lay the distal end of an elephant limb bone (see Figure 5). Immediately below was found an Indian stone mortar, and again below the latter occurred a cast iron Dutch oven. This association was obviously the result of re-working of these evidently non-contemporaneous objects. This may be explained in the following manner:

1. The gravel beds were originally laid down in alluvial fans together with the bones of elephants.

2. Subsequently, and presumably after the land had been cultivated, a deep water course was cut into the gravels.

3. The gravels eroded from this ditch were redeposited a short distance below in the same cross-bedded manner as the original gravels. These later deposits contain materials evidently of three different ages.

4. When originally discovered, the line of separation between the original beds and the re-worked gravels was not noticeable; but when the buried objects had been removed, a vertical break could be clearly seen a short distance within the gravel-bank. There was a complete lack of correspondence of the bedding across this contact. If the Dutch oven had not been found, it is possible that the break in the sediments would not have been noticed. We would, then, have had perhaps another "Pleistocene" artifact from North America.

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Museum of Paleontology
University of California

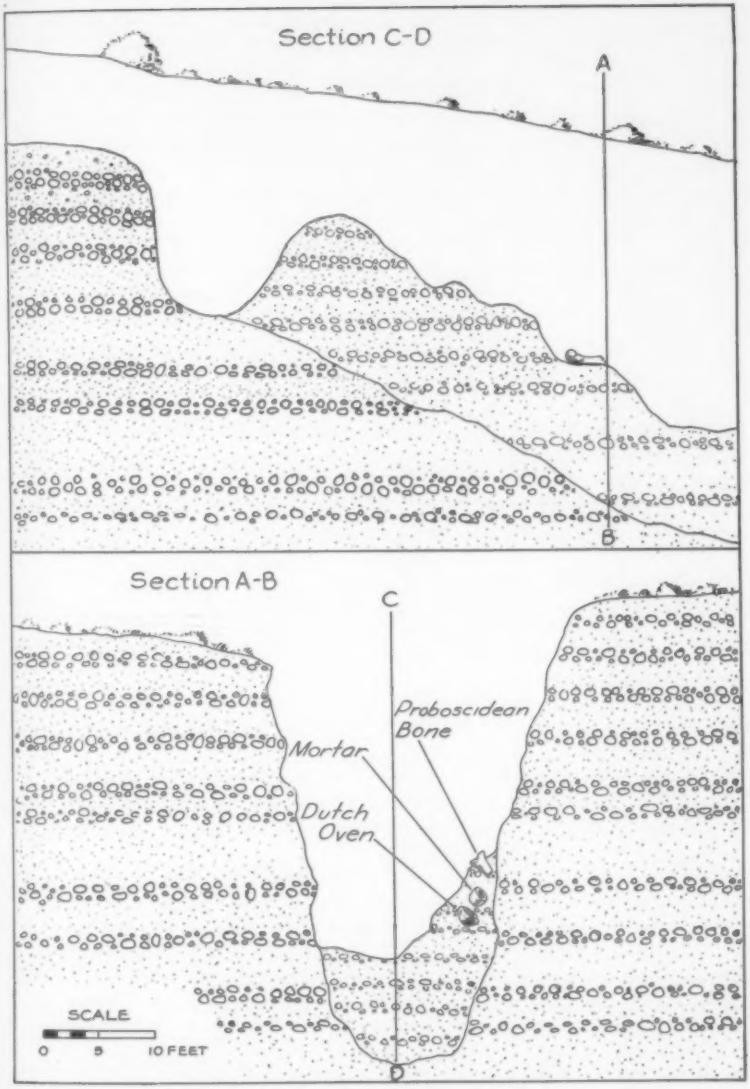

FIG. 5.—Sections through deposit containing Mastodon bone near Bitterwater, California.

CORRESPONDENCE

A NOTE OF CORRECTION

Attention should be called to an unfortunate error in the pottery chart in the chapter on the ceramics of Wheeler Basin in Bulletin 122 of the Bureau of American Ethnology. In the chart [on page 157] the site headings of the last two columns should be reversed and column 5 should be entitled La °3 and and the sixth and last column should be entitled Ma °4. This error is one for which the writer of the pottery chapter and of this note is wholly to blame since the original manuscript turned over to Major Webb was wrongly labelled.

JAMES B. GRIFFIN
Ann Arbor, Michigan

THAT MAGIC WORD, SOLUTREAN

The article by Hans Fischel, *Folsom and Yuma Culture Finds*, in Volume IV, No. 3, of AMERICAN ANTIQUITY, raises a number of points which demand critical treatment, something which was not done by Fischel. We shall take only one: his use of the term "Solutrean" in two different ways. Before proceeding, however, to a general discussion, it seems pertinent to draw attention to the fact that on page 236 Fischel states that the Yuma points resemble somewhat the Solutrean technique, especially as manifested in Cantabria. The reference (238) is to Forde's article (*American Anthropologist*, Vol. 32, 1932) "Early Cultures of Atlantic Europe." The figure referred to in Forde's article illustrates a series of elaborate arrowpoints from the well-known sites of Alcala and Los Millares. Neither one of these sites is in Cantabria nor do they have anything to do with the Solutrean.

Fischel tentatively suggests "the slender possibility of a North Asiatic origin for the Solutrean" on page 248 and as authority for this, cites, but does not quote, the suggestion made in Peake and Fleure's *Hunters and Artists*. This suggestion on the part of the two authors just mentioned is one of many speculations which they toss off in this popular presentation of prehistory. This type of speculation may add charm in the reading but it certainly is not based on any objectively verifiable facts.

The real point at issue is the use of the word "Solutrean" in a double sense. It is used very widely in this country to describe the fine pressure-flaking technique found on various flint and obsidian implements. It is also used as indicating a particular "culture horizon" in the prehistory of the Old World. The technical implications of this word are probably too well established to make it possible to adopt another term. Its brevity alone is a convenience. But with this as a starting point the additional implication is frequently made that there must be some historic connection between implements of the New World fashioned with a fine pressure-flaking technique and those of the Solutrean culture of Central and Western Europe.

The part which the Solutrean played in Europe is now sufficiently well known so that it is unjustifiable to speak of a Solutrean stage or horizon of culture. The Solutrean is a specific culture whose distribution we know with some accuracy and whose relationships to the other Upper Paleolithic cultures of Europe we also know with some precision. The immense amount of work which has been done in South Russia has amply demonstrated that the Solutrean played no part in cultural development in that area. The most easterly site with a true Solutrean industry is in Bessarabia. The origins of the Solutrean culture are admittedly not clear, but its earliest stages as represented in Hungary certainly lend weight to Burkitt's suggestion that it represents a fusion of a blade-using culture with an older core-using culture. European prehistorians have almost universally abandoned the attempt to explain the African pressure-flaked tools with fine, flat retouch in terms of an historic connection with the Solutrean of Europe. American prehistorians might ponder on this with some profit.

The Solutrean spread from central Europe to the north and the west, and in the latter region it underwent a peculiar and characteristic elaboration which one knows from the French and Spanish sites, but there is no concrete evidence that it then diffused eastward in the direction of Asia. It is one of a number of European Upper Paleolithic cultures, but it cannot in any sense be regarded as a culture stage. If anything demonstrates this clearly it is the Upper Paleolithic cultural development in South Russia, characterized by varying elaborations of Aurignacian and Gravettian industries.

One other point, which is commonly ignored, is that there is no clear way of showing any historic relationship between Solutrean pressure-flaking and that of the developed Neolithic and of the metal ages of Europe. The fine, flat pressure-flaking of these latter periods is frequently spoken of as representing a reappearance of the Solutrean technique, but without any exact indication as to how this happened. From the standpoint of chronology, and particularly from the standpoint of the other artifacts which Roberts describes as accompanying the Folsom complex at the Lindenmeier site, it seems more reasonable to look to the Neolithic cultures of the Old World for the prototype of the particular pressure-flaking exhibited by these and by many other American artifacts. Fischel takes Nelson to task in this connection for confusing chronological with typological considerations, yet himself sins egregiously in precisely the same manner.

The richness and complexity of the prehistoric cultures of North America are such that it is obviously difficult for workers in this field to keep abreast fully with the development of prehistory in the Old World. It cannot be stressed too much, however, that the classic sequence of prehistoric cultures as represented in south central France and Cantabria has not been applicable in any extended sense to Old World culture history for a good many years. Two articles may be mentioned which will make this statement abundantly clear. The first is by the Abbé Breuil, *Le Paleolithique ancien en Europe occidentale et sa*

Chronologie, Bulletin de la Société Préhistorique Française, Vol. 29, pages 570–8, 1932, and the second is by Dr. Garrod, *The Upper Paleolithic in the Light of Recent Discovery*, Proceedings of the Prehistoric Society, Vol. 4, Part 1, 1938.

THEODORE D. McCOWN
Department of Anthropology
University of California

A CONSIDERATION OF "FOLSOM AND YUMA CULTURE FINDS"

It has been recognized for some time that Folsom type artifacts are to be found in every part of the United States and as far north as Central Canada and New Brunswick, with primary concentration of occurrence in the High Plains and secondary concentration in the area of the Ohio River drainage. It has also been apparent that the Yuma type blades occur throughout the Great Plains and eastern Rocky Mountain area with indicated probable extent as far north as the Mackenzie and Yukon valleys. Despite the widespread surface occurrence of these recognized types, the only Folsom and Yuma finds of demonstrable antiquity have been located on the High Plains, the eastern piedmont of the Rockies, and the Guadalupe Mountains of New Mexico. This, then, is the nucleus of our present knowledge of the Folsom-Yuma problem. Is it yet time to offer a résumé of the subject, attempting to resolve the elements of the problem on such a limited basis? Are the data at hand sufficiently complete to permit a summary of observations? These are questions which every student of the subject should ponder before attempting to draw together the many loose ends represented by incomplete excavations and surface surveys.

With these considerations in mind, the writer offers the following notes on the article *Folsom and Yuma Culture Finds* by Hans E. Fischel which appeared in AMERICAN ANTIQUITY, Vol. IV, No. 3.

1. Although Mr. Fischel accepts the decision of the Symposium on Early Man held at Philadelphia in 1937 to call all fluted points Folsom, dropping the terms Folsom-like or Folsomoid, he nevertheless uses the former term in characterizing the majority of his eastern Folsom finds. Surely it cannot clarify the problem to retain "for the reader's benefit" such a hedging terminology, which only casts doubt upon the typology of most of the finds mentioned by Mr. Fischel in this respect. It should now be evident that a Folsom point by its accepted definition must be characterized by its channel flaking. Further specification of individual pieces can be concerned only with the nature of the surface flaking, marginal retouching, and basal edge grinding—whether such work be crudely or precisely and finely executed. Such difference in the precision of technique may be observed not only when the finest Folsom and Yuma specimens from the West are compared with the cruder specimens from the East or North, but also when the finest specimens from Lindenmeier and Clovis are compared with the cruder Folsom and Yuma types from *these same excavations*.

Thus, it is absolutely necessary to drop the terms Folsom-like or Folsomoid in order to clarify the terminology.

2. With reference to Dr. Harrington's Borax Lake, California, finds, in the section on Archaeological Considerations, and also Table I, Q, Mr. Fischel ignores the factors which should make any suggestion of stratigraphic superposition of Folsom points above the Borax Lake points tentative. The possibility of reversed deposition should not be overlooked. Similarly, no decisive conclusions may be drawn from the finding of Folsom and other types of points on the Brazos River Branch in North Central Texas. Indeed, it is possible to observe numerous sites in sandy eroded areas of the West in which Folsom points may occur in association with, or even above, numerous other types of artifacts.

3. Mr. Fischel's affirmation "Folsom Man was older than the oldest Basket Makers. This is borne out stratigraphically at Clovis, New Mexico, where Folsom points were discovered four feet below Basket Maker remains" is an error. No Basket Maker remains were discovered at the gravel pit near Clovis. The author evidently had in mind the find of a Folsom point beneath Basket Maker materials at Burnet Cave, New Mexico, although there is nothing here to indicate that these materials represent the "oldest Basket Makers."

4. Several open questions are somewhat arbitrarily resolved. First, as Roberts would not deny, a definite stratigraphic relationship cannot be proclaimed for Folsom and Yuma occurrences on the basis of finds made at Lindenmeier. The Colorado Museum party working at Lindenmeier in 1935 located a finished but unfluted point qualifying as a "Yuma" by definition, in the bottom of the stratum of occupation, and a Yuma fragment higher in the stratum proper. Such Yuma specimens as have been noted at Lindenmeier have been found within the range of the occasional occurrence of Folsom points.[303]

5. Anyone offering a résumé of Folsom-Yuma subject matter would surely do well to disregard many of the decisions and opinions set forth in the early years of research on the problem by observers, or at least to consult these observers once more. Such opinions have been greatly altered or no longer held by many of the first investigators. Figgins no longer "flatly denies any relationship between Folsom and Yuma points," and nowhere does Renaud "proclaim the Yuma points as decidedly later than the Folsom points."Furthermore, it is erroneous to say that "Figgins rejects any evidence for antiquity (at Clovis, N.M.)." Mr. Figgins, indeed, accepts completely the evidence for antiquity and association of artifacts with extinct fauna as presented by Howard and others.

6. In his tables, Mr. Fischel makes several errors of fact and some important omissions.

[303] Dr. Roberts advises me that no Yuma specimens have been found in the lowest stratum at Lindenmeier, below the black zone, although Folsom points have been noted in the lowest reaches of artifact occurrence.

Table I

A. Horse, musk ox and camel were not found at the Folsom type site, Folsom, New Mexico.

B. Mastodon was not found at Burnet Cave, New Mexico. Only one Folsom point was found at this site, and none with "dorsal ridge."

B1. Horse was found at Clovis, New Mexico, gravel pit associated with artifacts and mammoth bones.

C. Mammoth has not been found at the Lindenmeier site.[204]

Table II-7 and Table III-1

Neither bison nor "mastodon" bones (mammoth is evidently meant) in Yuma County, Colorado, showed evidence of being cut by human artifacts. A mammoth bone from here submitted to the Colorado Museum of Natural History was definitely determined by Mr. Figgins to have been gnawed by rodents. The mammoth bone in question was found six miles from the nearest Yuma artifact reported "in situ." (Information personally secured from Mr. Figgins at Lexington, Kentucky, 1939.)

Table II-13

The skeleton under the scapula of which a Folsom point was reputedly found (Nuckolls Co., Nebraska) was that of a mammoth, not a mastodon.

Tables L, III and annotations.

References to the three points found associated with the extinct flathorn bison (*Ovobison figginsi*) at Colorado City, Texas, are obscure and incomplete. This find is particularly interesting and significant because the two points from this site still available are variant from most recognized Yuma types. The third point was lost immediately after its discovery, in situ, and its type is not known.

Table III and annotations.

No Yuma points were ever associated with the Frederick, Oklahoma, gravel pit finds. The artifacts in question are indistinguishable from modern types, and are now considered by Mr. J. D. Figgins, under whose direction the original investigation was made, to have been fortuitously associated with the Pliocene fauna of the gravels. Workmen at the pit later confessed salting the gravels with hollow clay balls in which they

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[204] Dr. Frank H. H. Roberts informs me by correspondence that in 1938 the party under his direction recovered five feet of a mammoth tusk, some splinters of bone and considerable charcoal in the same horizon as the Folsom material about half a mile east of the Lindenmeier site. No implements or flakes were found with it, and it does not constitute a definite association with the Folsom complex. Although it cannot be concluded that the Lindenmeier Folsom people killed mammoth, Roberts is of the opinion that these mammoth bones are approximately contemporaneous with the occupancy of the Lindenmeier site.

inserted live toads. These toads were solemnly averred to be "Pleistocene" in age at the time the artifacts were being recovered from the same spot!

JOHN L. COTTER
University of Kentucky
Lexington, Kentucky

A REPLY TO RAY'S REVIEW

In the last number of AMERICAN ANTIQUITY (Vol. V, No. 1), Dr. Cyrus N. Ray uses six pages to deal with "Inaccuracies in Fischel's Folsom Article." Fortunately these inaccuracies take up only a minute part of Ray's account and could have been stated on less than a half page. In regard to the wrong initials of some authors and the reference to one of Ray's own papers mentioned in the first three paragraphs on p. 59 and the last paragraph on page 60, I plead guilty. As a matter of fact, immediately after the paper appeared in print, I had forwarded a number of additional errors to the editor, of which I like to mention here.

Page 241, line 9—Burnet Cave should replace Clovis in conformity with Table I, B.

Page 249, line 4—from the bottom should read: p. 236.

Page 255, No. 33—should have as bibliographical reference: 39.

Page 257 —annotations to the Frederick, Okla. site, first line should read: 36,500 years.

Page 261, No. 68—author's name: Kulm.

Although these errors are regrettable and deserve criticism, they must be attributed less to "old eyeglasses," than to the fact that the original proofs never reached me and that due to the pressure of time the editor could not apply most of the necessary corrections. When I thus stand convicted of these errors, the sarcastic tone of the reviewer and several inaccuracies of his own compel me to answer.

In regard to my rejection and omission of Dr. Jenks' points, I like to repeat that in the first place not I, but the thoroughly competent Dr. Roberts did the rejecting. Naturally, it is entirely Ray's privilege to follow Jenks, but the point depicted by me (Fig. 25, #10), should contribute more to the cause than any personal bias. Ray's belief that my statement of manyfold indications of a very late survival of the mammoth into recent times "is manifestly too improbable for a quotation in a scientific publication" really is directed against the editor. Personally, I had no intention to deny Ray's fossils a particularly high age. Secondly, I fail to see the validity of Ray's Comanche story in connection with the point at issue. Finally, I find myself in good company (Jones, Romer, Strong and others), and affirm my statement.

The doubts in Sayles' statements, dragged in by Ray (p. 60, line 4 and page 62, end of first paragraph), do not concern the writer here. Ray repeats himself three times in taking exception to one of my statements (p. 60, second para-

graph; p. 61, first paragraph, page 62, third paragraph), in which I quote him as assigning priority of some stemmed points to the Folsom points. It is true that I gave credit to Ray by mistake for Witte's Henrietta finds. However, Witte claims to have found at Henrietta points similar to Ray's Clearfork points, and of these Ray says (Bulletin of the Texas Archeological and Paleontological Society, Vol. 7.) that he (Ray) "takes no stock in the theory that stemmed and shouldered points were not used long before the Folsom points in America." Likewise I fail to see why Ray thinks I had assumed that he located only one ancient site. Apparently he labors under the misconception that my paper had as its main thesis a searching analysis of Ray's work. For the gentleman's benefit I therefore wish to state that I was interested mainly in critically illuminating certain attitudes in archaeological thought as they become apparent in a *general* assembly of Folsom-Yuma reports without going into a *specific* history of each find.

With my assertion of other non-Folsom implements found either not in situ or not datable, I did not think particularly of Ray's finds but of the older reports by Claypole, Abbott, Wright and others. The antiquity of Ray's finds had not been established at the time my paper went to press. Even now some dependable authorities will take issue with Ray's proof of human existence in America during various periods of the Pleistocene, based on the unproven extinction of certain animals during the Pleistocene. This was precisly one of my points: that faunal remains at present constitute insufficient evidence for dating, a point which Ray may argue but certainly has not discredited. The Annotations to my tables (page 256) referred to by Ray were appended, but kept separate from the tables for the good reason that the latter represent facts whereas the annotations reflect opinions. Therefore any criticism leveled against these is rather unimportant. However, when Ray today labels as "incorrect" my citation of his belief that Folsom points were made locally until a few hundred years ago, I grant him the right to revise his opinion, but the error lies on his part. Apparently he does not remember his statement made in Note to Gladwin's paper (*The Archaeology of the Southwest and its relation to the cultures of Texas*. Bulletin of the Texas Archeological and Paleontological Society, Vol. 6, 1934, p. 36), "It is the opinion of the writer (Ray) that such points probably were made locally up to within a few hundred years ago."

The last paragraph of Ray's review which fortunately contains in its later pages some new information, apparently is meant as an insult to the writer. Factually it remains obscure, because I have neither expressed a belief in any of Ray's theories nor materially or intentionally misquoted my source material.

HANS E. FISCHEL
Berkeley, California

NOTES AND NEWS

NORTHEASTERN AREA

The following item is from Dr. Cornelius Osgood, of Peabody Museum, Yale University.

"Mr. George A. Jackson, a graduate student at the Yale University Department of Anthropology, has excavated a shell heap in Black Hill, Old Lyme, Connecticut for the Yale Peabody Museum. The field work was done during the latter part of June and early July. Mr. Jackson determined the depth and the extent of the shell deposit but was unsuccessful in finding a stratigraphic sequence. At present the field material is being worked up in the laboratory."

Mr. Charles F. Goddard, of Long Island Chapter, New York State Archeological Association, reports that he and Mr. Roy Latham are excavating an extensive village and burial site on Shelter Island, off the Long Island coast.

"It seems," he says, "thus far, fairly prolific in pottery, the decorations on which show an unusual variety with some marked oddities, but all are either punctate or impressed. Two pots have been restored, a third will be. Bone and stone material is rare. There are few mammal bones, but many of fish. The diet seems chiefly to have been from the tide water. About the only stone implements, aside from a few wide triangle arrowheads, were six net sinkers. Two pottery pipes are fragmentary and of indeterminate type. Three flexed burials were found. One of these was accompanied by a small pottery vessel and a tortoise carapace cup or ladle, an unusual manifestation in this area. Work was suspended some time ago owing to the difficulty of exploring the very hard packed ground. It will be resumed in the late autumn."

Under a grant recently received from the Carnegie Corporation, Vassar College is starting a five year archaeological survey of the Hudson Valley as one of the activities of the newly created Division of Anthropology. This will consist of site and collection survey and the excavation of type sites. Dr. Mary Butler is in charge. Her aim is to make Vassar College a clearing house for information about Hudson Valley prehistory.

The Rochester Museum of Arts and Sciences began in July the excavation of an intensively occupied village and burial site on Frontenac Island in Cayuga Lake, N.Y. With three assistants, William A. Ritchie, in active charge of the work, had by the first of August explored about 700 square feet, finding 26 burials—extended, flexed, bundle, and cremation—some accompanied by dog skeletons and a variety of burial goods. Numerous artifacts of stone, bone, and copper indicate another component of the Laurentian Aspect. Pottery and steatite vessel sherds occurred only near the surface and no pipes had come to light. Archaic type materials, chiefly in the lower levels, raise the hope that a stratigraphic sequence will be revealed.

In June nine graves of the Point Peninsula Focus were excavated in Sea Breeze Park, near Rochester, by Mr. Ritchie and a museum party. With flexed, bundle, and cremated burials a considerable variety of grave offerings occurred, all typical of the culture except for chalcedony flake knives and projectile points of Hopewellian form. This find strengthens the suspected connection between the two cultures.

Dr. Dorothy Cross, of the New Jersey State Museum, has submitted an important note, which follows:

"During the past year the work of the WPA Indian Site Survey, sponsored by the New Jersey State Museum, has been concentrated on the Abbott Farm Excavation which is now entering its fourth year of operation.

"A recent and most significant find was a cache of 128 argillite blades which were compactly grouped in the yellow sand from twelve to eighteen inches below the present surface. The blades, measuring from 4 to 8 inches in length, were of the wide flat type so common to this site. It was this type of blade which was formerly considered characteristic of the so-called 'argillite culture.' A slender copper pin, 14 inches in length, was placed horizontally in the middle of the cache. The end of the shaft was flattened and bent to form a loop. Immediately below, a strip of copper was closely wound around the shaft as a form of decoration.

"As yet no analysis has been made of the pin, consequently its origin has not been determined, but it most certainly was not aboriginal. Its horizontal position in the middle of the cache precludes the possibility of intrusion and would definitely date the blades to the Contact Period. Thus we have the first concrete evidence that this site was occupied in early Colonial times. Also, this find seems to add further evidence to the fact that no distinct argillite culture may be recognized."

The researches of The Archaeological Society of Delaware are now well under way, according to Mr. C. A. Weslager, who states:

"On May 12, our society began work on its first digging project, the Crane Hook Site in Wilmington. Although our group was formed in 1933 we have purposely delayed any major excavating until now, realizing that we could proceed more intelligently after thorough study of the work done in New York, New Jersey, and Pennsylvania.

"The Crane Hook Site is apparently one of the oldest in Delaware, and may be entirely prehistoric. It is situated at the junction of the Christina and Delaware Rivers and during the past has produced for surface hunters, thousands of the types of artifacts assigned to eastern Woodland cultures. Industrial plants have gradually encroached on the site and today only a small part of it remains. This we are thoroughly exploring by uncovering the entire occupied area. The work is being done by our members, each participant having been assigned a section. Certain of our officers are supervising the work and collating

all data. We have interested a local geologist, engineer, and photographer in our cause and they have been very helpful.

"To date several hundred artifacts have been found. The most interesting discovery was a five-hole gorget found in a pit in association with a grooved axe and a broken pottery pipe. It is, of course, too early to draw any conclusions, and at the rate we are proceeding, we have at least a year's work ahead of us."

Dr. J. Alden Mason, of The University (of Pennsylvania) Museum, reports a project, initiated by Mr. Donald Cadzow, of the Pennsylvania State Historical Commission, under the auspices of the National Youth Administration, for Bucks and Montgomery counties, Pa., headed by himself, with Mr. Samuel W. Pennypacker III and Dr. Nathaniel Knowles in the field. A small amount of excavating has been done on two sites on Perkiomen Creek but the results have not as yet been significant. (*W.A.R.*)

Through the courtesy of the New England Mutual Life Insurance Company and the Turner Construction Company, Frederick Johnson of the Department of Archaeology, Phillips Academy, Andover, Mass. has removed part of an ancient fish weir which was found some forty feet below Boylston Street, Boston. There is no doubt that this is an extention of the weir which was studied by Shimer and Willoughby in 1913. It is too early to offer any conclusion concerning this discovery but it may be said that because the excavation was a large open hole it was possible to gather a considerable amount of detailed information concerning the character of the silt and the shells which covered the weir. Sketchy data on the plan of the "structure" do not yet prove that it was actually a weir but at present there seems to be no other explanation of its purpose. It may be said that there were several "building periods" to be seen and that there was some evidence of repair. Discovery of undamaged tops of the stakes is of some interest and perhaps of importance. These tops appeared at one level and since they showed unmistakable evidence of having been eroded in the water, they provide at least one very definite location of tide level. The relationship of this level to the period of "occupation" remains to be determined. Numerous questions which it is hoped an analysis of the field data will answer may affect the final estimate of age. Of considerable importance is the discovery that the underlying peat may be a salt water deposit, not fresh as was originally supposed. The discovery of layers of shells complicate the problem. These probably indicate mud flat conditions which again may indicate periods when the deposition of the silt was retarded. (*F. J.*)

SOUTHEASTERN AREA

The third Southeastern Archeological Conference was held at the Alabama Museum—WPA Archeological Laboratory in Birmingham on June 23 and 24. Thirty five persons representing archaeological projects or institutions

in seven states attended. The program consisted of papers and informal discussions on regional problems arising out of recent excavations. Abstracts of the papers presented and a summary of the discussions are to appear in a forthcoming issue of the Southeastern Archeological Conference News-Letter. The next meeting of the Conference is to be held in Macon, Georgia, during the fall. (*Charles G. Wilder.*)

At the present writing the re-excavation by the University of Kentucky of the famous Indian Knoll in Ohio County, Kentucky, only partially excavated by Moore, is well under way. Many more associated implements, called netting needles and net spacers, but now thought by us to be atlatl hooks and weights, have been found. Three other shell heaps and a large truncated pyramidal earth mound with an associated village consisting of about twenty rectangular house sites have been excavated. The last of these sites, encircled by a palisade, is a component comparable to Kincaid in Illinois. Excavation of the largest earth mound in Kentucky, in the central part of the state, showed that it was an Adena mound, containing nineteen log tombs. On the Ohio River, opposite the Scioto, a Fort Ancient village site with historic trade material has been excavated, establishing the historic existence of the Fort Ancient in Kentucky. Nearby, another large Fort Ancient village is being excavated at the present time. Three publications—two on shell heaps and one on Adena—will be released next fall. (*William G. Haag.*)

Since October 1, 1938, a LSU-WPA Archaeological Survey has been conducted in Louisiana under the direction of Mr. James A. Ford, Research Associate in Archaeology of Louisiana State University. During that time three sites have been excavated. These are the Crooks site in Catahoula Parish, Louisiana; the Greenhouse site in Avoyelles Parish, Louisiana, and the Little Woods site in Orleans Parish, Louisiana. The Crooks site was found to be a mortuary mound of the Marksville period. Excavation of this site has been completed. The Greenhouse site is a domiciliary mound site of the Troyville and Coles Creek periods. The Little Woods site is a shell midden of what appears to be the earliest horizon yet discovered in Louisiana.

Mr. Gordon R. Willey, formerly with Dr. A. R. Kelly, at Macon, Georgia is in charge of the laboratory in New Orleans.

At the present writing reports on the Crooks and Greenhouse sites are being completed, and should be ready for publication before the 1st of October. These works will be published by the Louisiana Department of Conservation in their *Anthropological Study Series.* (*Gordon R. Willey.*)

At Ocmulgee National Monument, investigations at Lamar site revealed the presence of a palisade surrounding the village which was located on an erosional remnant lying in the swamp and resembling an island. Core drilling has verified the supposition that the red clay on which the site rests is an erosional remnant. A levee is being built to protect the site from floods. Manu-

script describing the excavation and materials of Mound C on the Macon Plateau and comparing them with Small-Log Town House sites by Webb in the Norris Basin is now complete. In connection with the extensive analysis, it is planned to complete a similar report on the rest of the Macon Plateau Component. The laboratory is also handling surface and miscellaneous collections submitted by the National Park Service from various national areas in the Southeast. (*John C. Ewers.*)

The National Park Service has been excavating the site of an historic Chickasaw village, reputedly that of Ackia where the Chickasaw in 1736 decisively defeated a body of French and their Choctaw allies under Bienville. The site was made a National Monument in November of last year. The site has been completely excavated this summer. We have found a compact village, a fort, several round dwellings, two rectangular structures, and several poorly preserved burials. Archaeologically some interesting problems have appeared. (*Jesse D. Jennings.*)

SOUTHWESTERN AREA

Walter W. Taylor has been doing reconnaissance work for cave sites in the state of Coahuila, Mexico. Sites and localities now number sixty-three. Surface finds of pottery, fiber, and stone indicate affinities with Pecos and Big Bend Cave Dwellers, and probably later horizons in West Texas. Pictographs are of several types, including what is probably historic Apache and/or Comanche. One group of petroglyphs has been located. The material is now being studied.

At no time in several years has there been more archaeological activity in the Southwest than during the past summer. Investigations are being carried on in Basket Maker sites by both the Carnegie Institution and the Peabody Museum.

Earl H. Morris, working near Durango Colorago has been investigating sites of a Basket Maker II culture stage, which, although dates have not been released, appear to have been abandoned by A.D. 300. He has also been working with pottery-bearing, Basket Maker III horizons, in the same area. The final report of his work on early cultures in the Four Corners region is soon to be available.

J. O. Brew, working at Awatovi for the Peabody Museum, reports that the fifth and final season is now well under way, and that all excavation at the main site is almost finished. Watson Smith is working on a painted kiva, and one crew of workmen is excavating a new Spanish structure. However, the main work of the season is the excavation of small sites in the Jeddito Valley, and on Antelope Mesa. These carry the chronology of the Awatovi section back to a Basket Maker III horizon, giving a remarkably complete and long sequence for one section.

WPA grants in the Southwest have made possible work which under other circumstances would have been undertaken much less pretentiously. Odd S.

Halseth reports from Pueblo Grande that the field survey started last year with WPA co-operation continues in full swing, with some 70 sites located, and a number of trash mounds tested stratigraphically. Laboratory work is so arranged that field materials are handled as soon as brought in. An additional crew was started in July for the purpose of making a stratigraphic cut in the large Pueblo Grande mound, with Paul Ezell supervising. CCC work under the National Park Service continues construction and improvement of the area, with about one-half mile of adobe wall, seven feet high, nearing completion. In the library, reference material is being assembled for student use, under a simplified index system, and work has just begun on a series of exhibits for museum extension service. About sixty people are engaged on the project.

At Globe, WPA work under the direction of Mrs. Irene Vickery has terminated about five years of field research, and she now is engaged in laboratory evaluation of the materials gathered. With the final report of this material, much light will be cast on the problem of Salado Culture.

The Museum of Northern Arizona, at Flagstaff, has also completed five months of field work at Winona Village and in the vicinity of the Ridge Ruin east of Flagstaff, and is engaged in laboratory study of the material. The cosmopolitan nature of these sites should throw some light on culture combinations and evolution in this section. Most interesting single find was a burial of a medicine man, dating from the twelfth century, and accompanied by astonishingly fine and numerous offerings, including painted basketry and turquoise mosaics.

In New Mexico, excavation of village sites of pottery bearing culture along the Rio Grande in the vicinity of Presidio, Texas has been carried on by J. Charles Kelly, (Director), and Donald J. Lehmer (Field Supervisor), under the joint auspices of the Museum of New Mexico, Sul Ross College of Alpine, and the WPA. The excavations have yielded data concerning house types, a range of other material, and evidence of three chronological phases in a region known previously only through surface reconnaissance.

The Museum of New Mexico-WPA projects for the excavation and stabilization of the 17th century Franciscan Missions at the Pueblos of Abo, Quarai, and Pecos are continuing. Joe H. Toulouse, Jr., is in charge of the project at Abo; Wesley Hurt and John Corbet, at Quarai; and Bill Watkin, at Pecos. Under the same auspices, at Pecos, J. W. Hendron is opening a small group of rooms and restoring an adjacent kiva, as a public education exhibit.

One of the most interesting and pertinent problems now under examination in the Southwest is the Mogollon Culture. An unusual example of institutional co-operation is this summer going far toward a discovery of the constituents of this basic complex. Paul Martin, directing the Field Museum expedition, is working about ten miles west of Reserve, New Mexico. Intelligent choice led to the selection of a large pithouse village, the sherd complex of which was entirely Alma Plain and San Francisco Red. At present, one large pithouse

(thirty-three feet in diameter), one small pithouse, and one surface room have been dug. Of about 4,000 sherds of Alma Plain and San Francisco Red, no trade or decorated pieces have been found. Although several burned pine posts have been obtained no dates have yet been secured, but on a typological basis a tentative early date has been set for this site. The report by Martin on late Basket Maker sites in southwestern Colorado, released in June, may be considered as casting additional light on Mogollon influences in this section.

The Arizona State Museum expedition, under the direction of Emil Haury has been working at an early Mogollon pithouse site on Forestdale Creek, ten miles south of Show Low. The personnel of the party is largely composed of students. Several pithouses, a surface structure, and stone filled cooking pits have been found. The site is peculiarly informative in that though it is predominantly Mogollon it shows definite contact with Pueblo culture. Tentative dates have been set as pre A.D. 700.

The third site in the series is being dug by Paul H. Nesbitt, for the Logan Museum of Beloit, Wisconsin. The site is near Starkweather Ruin, previously reported, and is located on Wheatley Butte, near Reserve, New Mexico. Seven undergraduate students and three graduate students are participating. Pithouses excavated to date are of Georgetown and San Francisco Phases, and are both circular and rectangular, with circular firepits and lateral entryways. Intrusive pottery consists of two Gila Butte Hohokam Red-on-buff sherds, found in the fill of San Francisco houses, and northern intrusives including Lino Gray, Kana-a Gray, and Red Mesa Black-on-white. It is hoped that fragments of wood that have been found will add more dates to those from this section.

W. S. Fulton, working near Dragoon, Arizona, during the past several months has uncovered pithouse sites which show strong Mogollon characters, as well as apparently Hohokam influence. The publication of this material will throw still further light on the southwestern extension of the Mogollon Culture.

The University of New Mexico has a party in the field during August, to work in Jemez Canyon. Archaeological work will be under the direction of Mr. Paul Reiter, instructor in the Department of Anthropology and assistant curator of the Museum, assisted by Mr. Bill Mulloy, and enrolled students. Work consists of continued excavation of one of the large sites, and exploration of one or more of the caves in this section. In Chaco Canyon excavation of a small house site on the south side of the arroyo east of Casa Rinconada will be continued, as well as explorations of the general archaeology of the area. The work is under the direction of Leslie Spier and Frank Setzler.

Texas Technological College had work scheduled for June at the Arrowhead Ruin at Glorieta, New Mexico, for the fourth season. The party is under the direction of W. C. Holden, and includes advanced students. Previously thirty-four rooms and a kiva had been excavated, and three rooms and the kiva re-

stored. The site is reported as contemporary with Glaze I Period, with tree ring dates from the kiva determined by Stallings as A.D. 1392.

Mr. H. S. Gladwin reports that Gila Pueblo, of Globe, Arizona, is continuing its investigations of the past year intended to define further the problems relating to Hohokam Culture. Field work in connection with the Cochise Culture was conducted by E. B. Sayles in southeastern Arizona until late spring. Since then he has been working on reports covering his investigations of the past four years. Related problems have been under the investigation of Ernst Antevs, and others. During the past year, Mr. Gladwin has built a tree ring laboratory in his home at Santa Barbara, that this work might be carried on while he is not at the Pueblo. The J. H. Denisons have joined the staff of the Pueblo, and have been working in Santa Barbara, where the Director has also been preparing a report covering the work of Gila Pueblo for the past several years in northern Arizona and New Mexico. This and the Cochise report are scheduled for an early appearance. Deric Nusbaum, who at present is attending the Congress of Americanists in Mexico City, has also joined the Pueblo staff, and will assist other members in present investigations.

Two conferences have been scheduled for the summer. The first of these, the annual Tree Ring Conference, was held at the Arizona State Museum field camp at Forestdale in late August. Editorship of the Tree Ring Bulletin remains in the hands of A. E. Douglass, but the Managing Editorship was passed on to Edmund Schulman. Pressing problems were discussed, and a program of research and publication outlined. The annual Chaco Conference is scheduled for early September. (*J. C. McG.*)

NORTHERN MISSISSIPPI AREA

Richard G. Morgan writes of the archaeological work of the Ohio Archaeological and Historical Society:

"The Department of Archaeology is pleased to announce that Holmes Ellis has been added to the staff as Assistant Curator of Archaeology. Mr. Ellis will continue to carry on the work of the Lithic Laboratory in addition to his new duties.

"As a part of the WPA program of the museum a bibliography of American archaeology is being prepared by a group of eight workers. While it is planned to cover the entire field in this bibliography, the emphasis is being placed on the Mississippi Valley. The more than eight thousand separate items gathered to date have been arranged in three indexes: by author, by subject, and by region. As a part of the archaeological survey of the state an index of sites has been prepared, including all available information, such as location, culture, and type of material found. In conjunction with this index, the sites are being located on topographic maps, which have been cut and cloth-mounted for field use.

"At the present time the Lithic Laboratory is investigating the problem of the 'eccentric flints' from Oklahoma, is continuing its work on aboriginal flint

chipping, preparing a report on stone-working techniques, and assembling data pertaining to the flint disks of Hopewell type.

"Some time will be spent in the field visiting outcrops and collecting representative samples of flint for the comparative series. A limited amount of excavating is planned for the season."

Dr. Emerson F. Greenman is working in the Manitoulin Island region. His program includes further testing of a post-Nipissing beach, near Swift Current on Great Cloche Island, where a camp-site was discovered in 1938. Work will be concentrated on a search for early historic sites and other sites connected with abandoned beaches.

Thorne Deuel writes as follows regarding the work of the Illinois state Museum:

"At Cahokia, the French village is being explored with a view to the recovery of period objects and the restoration of old buildings by the State Parks Division. The investigation is being done under the WPA Statewide Museum Project sponsored by the Illinois State Museum, and is supervised by Thorne Deuel, Chief of the Museum, and Harriet Smith, State Supervisor of the Museum Project. Paul Maynard of the University of Chicago is conducting the excavation.

"A similar project under the same auspices will probably be commenced during August at Fort Massac on the Ohio River in Massac County, Illinois

"The Illinois State Museum is preparing for the exploration of a site in Sangamon or a neighboring county that appears to have Hopewellian affiliations. Both village and mounds will be investigated to get as full a picture as possible."

From Florence Hawley comes the following:

"Following the original plan, the 1939 work in the tree ring laboratory of the University of Chicago lasted only six months. The laboratory program spread over five major divisions.

"1. Filling in the early 1700's in the pine and oak master charts for the central area, and studying prehistoric droughts.

"2. Checking the limits of this large central area, which stretches from central Georgia and Louisiana to southern Wisconsin and from east Tennessee to Oklahoma City.

"3. Preparing measurements (on a newly designed self-platting machine) and photographs for fall publication of master charts representing the central area.

"4. Working up archaeological wood collections, especially from Tennessee, Georgia, and Wisconsin.

"5. Training students for future assistance in tree ring work.

"Field work for the summer has consisted of sampling growth records from trees in southern Canada, New England, and the highland area south to Ten-

nessee and Georgia, with the object of further checking regional limits and especially of locating stands of virgin timber and old log cabins which might yield enough to be used in dating mound specimens. At the end of the season some of the major problems of this large and difficult area were discussed with the southwestern dendrochronologists at the Tree Ring Conference held at the University of Arizona archaeology camp near Show Low, Arizona.

"Appreciation should be expressed for the very helpful co-operation of archaeologists, of saw mill operators, and of interested laymen during the season."

Edward H. Spicer writes concerning the field work of the University of Chicago:

"For the sixth season the University of Chicago is working at the Kincaid site, where the program calls for the completion of several pieces of excavation on the Middle Mississippi component represented there. Exploration of a structure on one of the large mounds and an attempt to discover the general plan of a portion of the village site are also on the program. An effort is being made to work out the relations to the Mississippi components of two sites with Woodland affinities neighboring Kincaid. The University is also co-operating with the Southern Illinois State Normal University in the excavation of a rock shelter near Carbondale, Illinois."

The Indiana Historical Society and the Indiana Historical Bureau are co-sponsors of a WPA Archaeological Project in Indiana. Although the project, as approved, provides for state-wide activity, only one unit has been placed in effect to date. The Angel Mounds site in Vanderburgh County is the scene of activity. This site, acquired by the Indiana Historical Society by purchase in 1938, is a Middle Mississippi site consisting of a large wall-enclosed village, truncated pyramidal mounds, and one spectacular bi-level truncated pyramidal mound having a large conical mound at the southeast corner of the upper level.

A great deal of preliminary work has been accomplished since April 27. Considerable wrecking, clearing, and grubbing had to be done and much fencing removed. A hundred-foot grid has been set out over about two hundred acres thought to cover archaeological material. A contour survey using a six-inch interval is under way and is showing on paper many features not readily seen by the eye. This survey, in conjunction with aerial photography and excavation, should revive many features which have suffered from a hundred years of cultivation.

A decadent slough surrounds a large part of the site and exploration was begun in a hundred-foot division calculated to both approach the village proper and produce a profile of the slough bed at the time the site was inhabited, at one operation. One of our many surprises to date was the finding of habitation debris twenty-four and seven-tenths feet below the present slough bed, under silt of recent origin and on top of sandy silt, loam, and sand which at one time was the bed of the slough.

Pottery is everywhere abundant with stone and bone work so far at a premium. September should see us well into the village and the eastern segment of the village wall. (*G.A.B.*)

MIDDLE AMERICAN AREA

In the last January number of AMERICAN ANTIQUITY (pp. 213, 214, pl. 10) Dr. George C. Vaillant published a map prepared by the Departamento de Monumentos, Secretaría de Educación Pública of the Mexican Government, showing the localities in which archaeological investigations had been pursued by that Department and other institutions in the season 1936–1937, and accompanied it with a short explanatory text. It gave an excellent impression in a concise way of the large amount and varied nature of the work being done.

During the seasons of 1937–1938 and 1938–1939 researches have been continued at some of these places and begun at others by most of the institutions indicated in the above-mentioned map. Much of this work has been done by the Departamento de Monumentos; I am indebted to Sr. Eduardo Noguera of the said Department for the following notes upon their activities.

CHICHÉN ITZÁ, Yucatán: Examination, repair and reconstruction was continued upon the Ball-Court, especially upon the "Temple of the Tigers" on the east wall. This was entirely restored, all the fallen stones having been replaced in their proper positions. Also a careful reproduction was made of the painted murals which were almost entirely faded. All of the major edifices as well as the roads to the Nunnery and to the Cenote of Ixtolox, and the ground surrounding the Sacred Cenote were cleared and cleaned.

UXMAL, Yucatán: Part of the structure known as the Palace of the Governor, as well as parts of the Nunnery Quadrangle, were strengthened and restored, replacing all the fallen building stones.

TAJÍN, Vera Cruz: The work of repair and restoration was continued; the stairway was restored. Exploration of the surroundings revealed many mounds of large dimensions, ball-courts, and pyramids with temples of sculptured columns. Structures A, B, C and D of the group known as "Tajín Chico" were excavated and repaired, and Monument #2 was investigated.

MISANTLA, Vera Cruz: Repair work was done upon edifices A, B and F. A new architectural feature, consisting of a subterranean entrance which leads to the upper part of the structure was discovered. A similar feature was found at Tajín.

CHOLULA, Puebla: The investigation of this immense pyramid with its superposed structures was continued by means of tunnels.

MONTE ALBÁN, Oaxaca: Lic. Alfonso Caso continues his explorations at this great site, a joint project of the Departamento and other institutions. Numerous structures on the "Meseta del Cerro," including that on the North Platform, termed "Los Danzantes," a ball-court, and an edifice with a circular base have been investigated, and a number of tombs and graves found.

TEOTIHUACÁN, Mexico: Many of the structures and the tunnels in the Pyramid of the Sun were repaired with liquid cement. The "Street of the Dead," the main highway, was cleared of debris, and other repairs were made on the Pyramid of the Sun, the Citadel, and the Temple of the Priests.

TENAYUCA, Mexico: Repairs of the pyramid were made, the vegetation cleared, the tunnels completed and electric light installed in them.

CUICUILCO, D. F.: New excavations at this Archaic pyramid revealed elements whose presence had not been suspected.

PALENQUE, Chiapas: The Temple of the Sun, and part of the Palace, were repaired. In the former, part of the roof-comb was restored and the lintels repaired. Numerous new reliefs have been found.

Minor explorations are now being made to tie together the work in the principal archaeological zones; such important intermediate points are: *TEXMELINCAN*, Guerrero; *TEPEACA* and *TEHUACAN*, Puebla; and *LOS TUXTLAS*, Vera Cruz.

Each exploration is preceded by a study of all the data extant, historical, legendary, and scientific. The region is surveyed, plotted and photographed before excavation is begun. The architectural features are studied and, wherever possible, repaired and restored. Paintings and sculptures are recorded, stratigraphical excavations are made to obtain and classify ceramic material, and the indicated studies are made. The orientation of the monuments is carefully observed, and archaeological, epigraphical and comparative studies made.

The Middle American investigations of the Carnegie Institution of Washington in the season of 1937–1938 are recorded in considerable detail in the Year Book No. 37 (Dec. 9, 1938), from which the following summary is taken.

The most interesting report, as showing the great number of "cities" still to be found and investigated in the Maya region, is that of Karl Ruppert on the Campeche Expedition. He, with John H. Denison, Jr., and William E. Shepherd, spent the months of February and March, 1938 in southeastern Campeche and southwestern Quintana Roo. Fourteen separate sites, each with at least one large masonry building, were found, apparently only one of which was known before. The largest town, *PECHAL*, contains a court, 68 by 75 meters, which was apparently an amphitheater, surrounded by a mound or thick wall broken by only four entrances. The surrounding structure includes tiers of eighteen to twenty continuous steps or seats at the base which, it was estimated, would have seated eight thousand persons. Only one ball-court was found. The architecture of the region most resembles that of *RIO BEC*, with frequent towers. One building had three towers, one of them 20 meters high. Another, with two towers, showed the interesting feature of a subterranean passageway which led from the chamber behind one tower down into the heart of the pyramid, across, and ascended into a chamber behind the other tower. Buildings with as many as fourteen chambers were recorded, as well as roof-combs, moats, stucco masks, towers with rounded corners, false stairways,

columns with seated human figures in stucco low relief, and elaborately decorated stucco façades. A number of stelae without readable dates, generally badly eroded, were found.

COPAN, Honduras: G. Stromsvik, Aubrey S. Trik and J. M. Longyear conducted the fourth season of work in cooperation with the Government of Honduras. The dam and diversion canal made in the previous year held firm and may be expected to preserve the ruins from further demolition. The ball-court discovered in 1937 was excavated, repaired, and partly restored. It is decorated with six monolithic parrot heads. Two earlier dismantled courts underlie the latest one; a dated stone belonging to the last phase afforded the Maya date 9.17.4.0.0, and one from one of the earlier courts gave 9.4.0.0.0, 260 years earlier. The famous hieroglyphic stairway was partly restored.

The two-story temple of Mound 11 of the Acropolis Complex was examined. The most interesting feature is a vertical shaft from the floor of the central chamber into the substructure, 5 meters to a floor. It was filled with debris, animal and human bones, and fragments of a stone censer lid with the date 9.17.2.0.0. At the base of the shaft was a cache. In the temple are sculptured hieroglyphic panels and a new inscription with the date 9.17.0.0.16.

The "Reviewing Stand" was examined and repaired and found to consist of six steps 16.3 meters broad with an inscription on the top step flanked by kneeling figures. An unusual feature of the substructure is a number of niches; two of these continue into the pyramid, connected by a passage with a small chamber at each end. The Jaguar Stairway of eight steps was repaired.

The ceramics were studied by means of test-pits and trenches, and three periods were identified. 1) In the earliest or Pre-Acropolis period Usulutan ware, characteristic of the most ancient horizon in the Guatemalan Highlands, was found in large proportion, mainly in the latest phase. 2) Acropolis period; Usulutan ware declines and polychrome rises. Carved brown ware and hematite red ware are introduced in the last phase of this period which is the zenith in variety of types and excellence of decoration. 3) In the Post-Acropolis period coarse-textured, thin-walled utility ware is found in the surface dumps, indicating post-decline occupation. In the Acropolis period are found some trade pieces from late Ulua Valley and Lake Yojoa, and a few Peten polychrome types. Dating, as well as connections are indefinite; the Pre-Acropolis period is probably indefinitely before Cycle 9, the Acropolis Period from early 9 to 9.18, Post-Acropolis after that.

Early in 1938 J. Eric Thompson conducted researches in the non-agricultural area of the Great Southern Pine Ridge of central British Honduras in a search for a pre-agricultural population in the Maya region. The results were negative; the few remains seem to be shrines of the Maya period. He then examined some ruins at *XUNANTUNICH* or *BENQUE VIEJO* and determined three sequent pottery phases, correlating with San José III, Transition III–IV, and close of San José IV; and also a fourth unstratified phase, relating to Uaxactun 1a (Mamon). These investigations have thus clarified the relations

between San José, Mountain Cow and Uaxactun. He then examined a new site in northwestern British Honduras known as *LA MILPA*. Altars, pyramids and apparently a ball-court were found there; the masonry style is early Peten. Twelve stelae, nine of them carved, were found, one yielding the date 9.17.10.0.0.

In November and December, 1937, Karl Ruppert, in association with Lic. Juan Valenzuela and Sr. Augustín García Vega of the Mexican Government pursued researches in the region of San Andrés Tuxtla, Vera Cruz. At *MATECAPAM* are about forty mounds of which three were partly excavated. Two mounds and three plazas were trenched for ceramic stratigraphy. One mound is a two-terraced pyramid made of ground lava rock and adobe; another terraced mound is circular. In ceramics, resemblances were noted to the red-on-orange of the second, and the incised gray of the third period of Monte Alban, to certain types of the Isla de Sacrificios, and to the black-painted Huaxtec figurines. Local types were not determined.

The work at *UAXACTUN* was ended in 1937 after eleven seasons; only a small part of the results have been published. No work was done at *KAMINALJUYÚ*, *CHICHÉN ITZÁ*, or *SAN JOSÉ*. Alfonso Villa R. found a new monument at *TILA* in the Chiapas highlands, bearing the date 9.13.0.0.0.

One of the most interesting projects was the first detailed survey of *MAYAPAN*, the third great city of the Maya Late "Empire," by Mr. R. T. Patton. A peripheral wall five and one-half miles in circuit was located, enclosing an oval space two square miles in area, with the main structures in the center, including four round towers. The architecture is inferior, most closely resembling that of Tulum, also a walled city. Nineteen cenotes were discovered within the walled area, and eleven stelae, nine of them sculptured. The deciphered dates seem to range from 1185 to 1283 (Goodman-Thompson correlation?).

H. E. D. Pollock conducted an architectural survey in Yucatan, and F. B. Richardson continued his studies on Maya sculpture for the purpose of tracing artistic evolution and of establishing criteria for determining the age of undated monuments. The artistic development seems to tie in with architectural and ceramic evolution. Mr. Richardson made a rapid reconnaissance to little-known peripheral Maya regions to south and west, discovered some unrecorded sites, and reached some important conclusions. In this region there is a sharp distinction between lowland and highland cultures. The "Chorotegan" sculptures of Nicaragua have no obvious close relationship to other areas. The Chorotegan culture probably did not antedate the Mayan. The oft-noted resemblances between the Pacific Coast of Guatemala and southern Vera Cruz, Tabasco and northern Chiapas are emphasized. The Alash River Valley in Honduras is archaeologically rich and very little known; one site shows Maya traits overlaid by non-Maya ones. The Pacific Coast of Guatemala is a very important region for cultural connections; the highlands have much in common with western Salvador.

Robert E. Smith made a comparative study of figurines, since the earliest ones from Uaxactun have some resemblance to those of the oldest cultures of

the Guatemalan Highlands, and to the Archaic of Mexico. To further his studies he made stratigraphical excavations at Finca Miraflores (*KAMINALJUYÚ*).

Anna O. Shepard made technological researches on San José ceramics. The problem of the appearance of tuff-tempered pottery (probably imported) in the normal limestone-temper region was attacked. The investigations upon maize, its origin, and on *teosinte* were continued by R. Stadelman and J. H. Kempton.

The interesting and important Tuxtla region of Vera Cruz has been the object of concerted attack. In addition to the joint expedition of the Departamento de Monumentos of Mexico and the Carnegie Institution under Srs. Valenzuela and García, and Mr. Ruppert, another joint expedition, that of the National Geographic Society and the Smithsonian Institution, operated here for four months during the winter of 1938–1939 under the leadership of Matthew W. Stirling. The latter has just published a popular account of the work in the *National Geographic Magazine* for August, 1939, entitled "Discovering the New World's Oldest Dated Work of Man."

The work centered at an ancient site near the village of *TRES ZAPOTES* where more than fifty mounds were found in an archaeological zone that stretched for more than two miles along the Arroyo Hueyapa. Many of these mounds were trenched. A cemetery was discovered from which a large collection of pottery vessels and figurines was obtained. Two horizons were here indicated. Near the surface were cremated burials placed in pottery vessels with covers. At a considerable depth beneath were direct inhumations with pottery objects of an entirely different type.

Upwards of nine carved monuments or stelae were found of which three are of especial importance. A fragment bearing a well-preserved date in bar-and-dot numerals was deciphered as giving the date November 4, 291 B.C. in the Spinden correlation, or about 31 B.C. in the Goodman-Thompson correlation, in either case making it by far the oldest known dated monument in America, 193 years earlier than the Tuxtla Statuette, heretofore the oldest. The most spectacular find, however, was an immense, beautifully preserved, sculptured human head, about six feet in height and diameter and of an estimated weight of ten tons, which had been covered to the crown with earth; it rests on a prepared foundation of unworked slabs of stone. Another fallen stela, measuring about 17 by 7 feet, and twenty inches in thickness, may be of even greater weight. A fragmentary stone box with high relief carvings, probably for blood-sacrifice, is one of the most ornate known examples of Mexican sculpture.

This culture is assumed to be of Maya affinities and to carry the Maya area 150 miles west of the westernmost previously known Maya site, Comalcalco. The archaeological aspects, however, such as the massive stone head and the stone "yokes," have their closest analogies on the Pacific Coast of Guatemala, such as at the site of Baul, generally considered to be of Pipil culture; the Pipil

spoke a Nahuatlan language, related to Aztec. The calendar used throughout this region was basically the same, and the sculptures of the Baul region sometimes show the bar-and-dot numerals.

The excavations of the American Museum in the Valley of Mexico have been discontinued for the last three winter seasons while Dr. Vaillant studies the results of his many years' work and prepares his reports. I am indebted to Mr. Gordon C. Ekholm for the following report on the new activities of this institution.

Since October, 1937, The American Museum of Natural History has been engaged in a project of archaeological research in northwestern Mexico, the work being carried out by Mr. and Mrs. Gordon Ekholm. The purpose of the project has been to explore the archaeologically unknown area extending from the Culiacán River in Sinaloa north to the international border, with the hope of clarifying the important problems concerning the interrelationships of the Mexican and Southwestern areas.

Two field seasons of six months each have been completed, the time being about equally divided between surface reconnaissance and excavation. Approximately one hundred and fifty prehistoric sites have been located, and, although the material collected from them and in the excavations has not as yet been thoroughly analyzed, a few results might be indicated.

The Sinaloa cultures, characterized by elaborately painted and incised wares of definitely "Mexican" affiliation, have been found to terminate in the north at the Fuerte River and not to extend into Sonora. The most extensive excavation made was at a site near the town of Guasave on the Sinaloa River where a culture definitely related to those further south in Sinaloa obtained. A low artificial mound was cleared which contained one hundred and fifty burials, both full-length primary interments and secondary burials, the majority of the latter occurring in large urns. A large amount of very fine cultural material was obtained, including many distinct types of polychrome and incised pottery vessels, a number of copper ornaments, two alabaster vessels, two ceremonial masks, and a variety of worked shell objects. Nearly all of the skulls show extreme frontal deformation.

The culture represented at Guasave appears to belong in the main to what Drs. Sauer, Brand, and Kelly have termed the Aztatlán Complex and which was found by Dr. Kelly to be the earliest of four culture phases at Culiacán. (Dr. Kelly's report on her work at Culiacán has not yet been published.) As we have found to the north of Culiacán no evidence of the last three Culiacán phases, it appears that the elaborate manifestation at Guasave belongs to a period somewhat earlier than the Spanish Conquest.

Throughout most of Sonora south of the area of the Trincheras culture, archaeological sites are relatively rare, the deposits are thin, and there is almost an entire lack of painted pottery. The expected condition seems to prevail—that there was little intercourse through this area in later periods when both the Southwestern and the Sinaloa cultures reached a fuller development.

There is a series of sites located along an old course of the lower Mayo River which seem to show certain basically Southwestern features, such as simple vessel forms without leg-supports or other elements which we consider "Mexican." There appears to be a total absence of painted decoration, the most characteristic pottery being a fine hard redware which in quality and finish seems to be more closely related to the early Mogollon redware than to any other of which we know. The few figurine-heads found appear to be fairly closely related to those of Snaketown in Arizona. Such similarities with the Southwestern cultures as well as other similarities with things found at Guasave and the consideration of the intermediate geographical position of these sites suggest that we have here some form of early cultural link between north and south. Further analysis is required to define its exact nature.

All along the coast of Sonora and northern Sinaloa shell-heaps were found to be numerous, but the material collected from them as well as from the many plainware sites throughout Sonora awaits more thorough study before any general statement of its significance can be made.

For the following report I am indebted to Linton Satterthwaite, Jr., leader of the recent University Museum Expeditions to Piedras Negras:

The University Museum, University of Pennsylvania, prosecuted its eighth (1939) season at Piedras Negras, Guatemala, under its contract with the Ministry of Public Education of Guatemala, and aided by a generous grant from the American Philosophical Society. The staff consisted of the writer and Mrs. Satterthwaite, William S. Godfrey Jr., and Don Victor M. Pinelo, government inspector.

Energies were focussed especially on one temple mound, Structure K-5, because from previous work by J. Alden Mason it was known that on the lower of three levels was a non-vaulted one-room temple building very much larger than any other known in the Maya Old Empire region; and because it was thought to be a simple rectangle in plan, in sharp contrast to the more complex plans of the surface temples. Both temple and the "building-platform" on which it rests form simple rectangles, the latter with a separate stairway leading down to the top of the pyramid, as expected. Surprisingly, the two-terraced pyramid is in the complex style characteristic of the site, and believed to be derived from the Peten center of the Old Empire, having double outsets forming inset corners, which are rounded. The pyramid rests on a broad front basal terrace with separate stairway. Temple building, building platform, pyramid and basal terrace were built as a unit. The mixture of styles suggests a mixture of cultural influences.

In the next period, the pyramid was doubled in height, the added terraces burying the temple building and its platform. A single new and narrower stairway rose from plaza to pyramid top, the latter rising by two steps at the rear, without a separate building platform. No remains of a masonry temple building were discernible, and two doubtful post-holes raise the very uncertain possibility of a wooden temple. In the first of three phases of the final period,

the pyramid was extended to front and rear, but not at the sides; the basal terrace was likewise extended, and new stairways provided for it and the pyramid. A building platform in Peten style was placed on the remodeled pyramid, and a stone temple on this. All but vestiges of the latter had been removed. The separate building platform stairway was apparently bifurcated to form a niche for the reception of "Lintel" 7, assigned the dubious date 9.12.10.0.0 (??) by Morley on various grounds. In the second and third phases, the building platform was modified twice, and a new masonry temple of Peten style with vaulted roof and probably a roof-comb was built and remodeled once. Elaborate stucco masks were placed on each side of the pyramid stairway, probably on all four terraces, and Stelae 39 and 38, dated by Morley at 9.12.5.0.0 and 9.12.10.0.0 were erected on secondary platforms built against the basal platform and on its stairway. The 9.12.5.0.0 Initial Series is well preserved. The stelae were certainly erected in the second or third phase, or form a still later phase.

In all three periods smoke-blackened column altars stood on the pyramid top, in front of the building, as well as within it.

The whole complex postdates remains of a Peten-style platform at one side, and both of these rest, in part, above earth containing flanged-bowl potsherds, which lies on an earlier occupation level. A few negative-painted sherds were found in the hearting of the earliest building and building platform of structure K-5, but were absent in the earlier flanged-bowl deposit.

Preliminary deductions are that the early large rectangular temple dates well after Peten-style architecture, at least as applied to substructures, had made its appearance, and during or after a flanged-bowl ceramic period. Mask decoration of pyramids seems to be a late feature in the local absorptions of Peten-style architecture, which extended over a considerable time. The final vaulted temple, although one of the more massive at the site, almost surely postdates "Lintel" 7, and was probably erected in 9.12.5.0.0, tending to confirm the theory that vaulting did not appear in the Usumacinta region before the middle of Cycle 9. The famous Piedras Negras so-called lintels were probably placed as vertical panels in or on building platform stairways, a logical placement for detailed small-scale carvings; important ceremonies took place on the stage at the top of the pyramid, before the temple, as in Mexico, as well as within it. Negative-painted pottery seems to have appeared before 9.12.5.0.0, probably well before the middle of the cycle.

Architectural features were worked out in numerous other mounds, but space-limits forbid their summary except to state that three pyramids have rounded corners without the usual Peten-style outsets. Test-pits were sunk in the east and south groups to test the possibility that ceramic types predating those of the flanged-bowl period had previously been missed; our preliminary opinion is that no evidence for an earlier style was encountered, though it must be admitted that the quantity of sherds was disappointing in most pits.

Accordingly we still postulate that the earliest architectural activity, known to predate the carved monuments which begin about 9.5.0.0.0, was within the flanged-bowl period. Some sculptured fragments were recovered, but no datable texts.

Dr. Mary Butler spent the first five months of 1939 in field investigations of the ceramics of the Department of Alta Vera Paz, Guatemala, financed by a grant from the Penrose Fund of the American Philosophical Society; this had been preceded by several months of study of the ceramic material from this region in the University Museum and other collections. Her excavations were in the region of Cobán, and principally at the village of Carchá. "Three main ceramic periods were found, related to, and showing contact with, those of Chamá, but establishing in Alta Verapaz another ceramic sub-area with marked local characteristics. The earliest of these periods shows in its lowest level a possible connection with the "Archaic" culture that, in the Maya area as in Mexico, is the earliest that we know." Her previous studies had indicated the existence of five periods in the Chamá area, covering the known range of Maya culture from its earliest phases to the Spanish Conquest, a sequence which is corroborated in its main points by those worked out for other parts of the Maya area.

In the course of her work Dr. Butler also studied part of the large archaeological collection of E. P. Dieseldorff in Cobán, and did a little investigation in the Department of Suchitepequez on the Pacific drainage of Guatemala.

(*J.A.M.*)

BOOK REVIEWS

Excavations at Snaketown. Volume I, Material Culture, HAROLD S. GLADWIN, EMIL W. HAURY, E. B. SAYLES, and NORA GLADWIN. Medallion Papers, No. XXV.

Volume II, Comparisons and Theories by HAROLD S. GLADWIN. Medallion papers, No. XXVI, Privately printed for Gila Pueblo, Globe, Arizona, December, 1937.

These two well organized, beautifully printed, and well illustrated volumes describe in detail the results of about ten months' intensive work in 1934 and 1935 at a large site, Snaketown, in southern Arizona. This site lies in the heart of the Hohokam area as known today.

Before proceeding with the review proper, it may be well if I explain a few terms.

The term Hohokam may better be understood if I state that there are, according to present classifications, three major culture divisions in the Southwest; Pueblo (or Anasazi) Mogollon, and Hohokam.

The Pueblo culture, best and longest known, flourished in the "four corner's region," i.e., where the borders of Utah, Colorado, Arizona, and New Mexico have a common meeting point.

The Mogollon culture, not yet generally accepted as a separate entity, flourished (generally speaking) in west central New Mexico and east central Arizona.

The Hohokam culture, first recognized as a separate entity by Gladwin, Haury, and Sayles, thrived in southern Arizona.

It should be understood, of course, that no one of these cultures remained isolated unto itself. Each one sent out cultural "waves." For example, Hohokam pottery, ball courts, and some other Hohokam traits are found near Flagstaff, Arizona—right in the western part of the Pueblo area. And conversely, Pueblo pottery was found at Snaketown.

PAUL S. MARTIN

VOLUME I—MATERIAL CULTURE

This volume is concerned primarily with the extraordinarily precise methods of digging and the results thereof—the irrigation canals, houses, burials, stone, bone, and shell artifacts, metals, pottery, petrography, figurines, clay objects, and the conclusions.

But merely to list the contents of this volume is not enough. To do more than this, however, is exceedingly difficult because this volume of 300 pages is well-knit, comprehensive, and concentrated. The various chapters were written by the authors named in the title quotation. The following, then, is a brief résumé of some of the more interesting (to me) and significant discoveries.

Mr. Gladwin states that he and his staff attempted (in Volume I) to describe the features and to reconstruct as far as possible, the history of a people

who once lived in southern Arizona. The approach, quite properly, was historical and only the most careful and exact methods were employed to unearth this history. Some of the principal aims of Mr. Gladwin and his able assistants were to show how the Hohokam adapted themselves to a very harsh environment, how they achieved civilization, and how conjectural interpretations may be skillfully distilled from the mere measurements of houses, firepits, and canals, the careful study of all materials recovered, and from the objective analysis of pottery. Many may not agree with all the theories that are set forth in Volume II, but all will agree that the whole job—digging and theorizing—was brilliantly conceived and carefully done.

As stated earlier, Mr. Gladwin and his associates, Haury and Sayles, were the first really to recognize a new and practically unknown culture. [I well remember the scorn and jeers which greeted their modest, preliminary statements which were made at an archaeological conference. The standpatters, who lacked vision and what anthropologists most need—tolerance, impolitely ignored the announcements of these upstarts and with a delicate sense of humor labeled this new culture "hokum." I must candidly admit that I now feel sadistically gleeful about the outcome of this whole matter, since the distinctiveness of the Hohokam culture has so well been proven; and I hope that the staff of Gila Pueblo takes some enjoyment in seeing their unsympathetic colleagues put to flight.] Cushing in 1887–88, Mindeleff in 1896, and Fewkes in 1908 all had conducted some investigations in the Hohokam area, but in sites which had been jointly occupied by Hohokam and Pueblo peoples. (It was not until Gladwin worked at Casa Grande and at other small sites in that vicinity that it was recognized that the Hohokam and Pueblo Indians had lived peacefully together in the same villages, sometime after 1300.) In 1930, Dr. Van Bergen working jointly with the Los Angeles Museum excavated the Grewe Site (Arizona). This excellent work confirmed the ideas that Gladwin had evolved in 1927 and 1928.

Before excavating this newly found culture (1927), the staff of Gila Pueblo felt that it was more important first to seek the boundaries and contacts of the Hohokam culture. Searching six years for evidence of the early stages of Hohokam culture produced no results; it was therefore decided to excavate Snaketown. The results of this work are startling and have contributed more to our knowledge of an important area of the Southwest than has any other one excavation. As such, this work and the accompanying report stand as a monument of great accomplishment to the members of Gila Pueblo. I am proud to applaud their efforts and am happy that I have been more or less in on the whole thing right from the start.

Earlier, I mentioned the careful methods used in obtaining the data from Snaketown. Haury's exposition of the stratigraphy of the site and how it was discovered and recorded will serve as a classic example and model for archaeologists for decades. This chapter, (IV) should be read by all students. Briefly, the fat deposits of rubbish made it possible to use stratigraphy rather than

typology alone. All chronological trends in pottery, houses, and all other materials were worked out by observing the changes as they occurred from top to bottom in the rubbish mounds. Portions of the large refuse mounds were removed under absolutely controlled conditions. That is, the rubbish was taken out in carefully measured blocks, two meters long, one-half a meter thick, and one-half a meter high. Each block of dirt was screened and all sherds were saved and counted by blocks. From the results thus obtained, an accurate succession of pottery types was worked out.

Prior to the excavations at Snaketown, no ball courts had ever been found outside of the Maya area, Cushing, Fewkes, and others had observed the large ovaloid depressions which occur in the Hohokam area and had called them reservoirs, temples, thrashing basins, wells and so on. [Gladwin pointed one of these depressions out to me in 1933 and said that he thought they might be ball-courts. I thought he was crazy, but knowing his flair for predicting the unpredictable, I kept my mouth shut, thank God.] Excavations in two of these depressions showed that they were indeed ball-courts and that they were similar to those found in Middle America. Haury speculates that the Middle American ball-courts may have been derived from the Hohokam. The Middle American purists, who would keep the Maya in permanent quarantine by advocating a kind of Maya Monroe doctrine, will probably howl at this suggestion. Even if Haury's mildly expressed speculation be incorrect the general effects which he may have thereby produced, are all healthy. It does one good to squirm now and then.

The story of the irrigating canals of the Hohokam is of absorbing interest and for the first time, we have a full discussion of this subject. The task of digging and maintaining these ditches must have been a tremendous job for the Hohokam. Test trenches made in the old canal beds showed that silting-up was an ever present problem, then as now; and that the Hohokam Indians were forced to clean out these irrigating systems at frequent intervals. The main Snaketown canal was about ten miles long, although others in the vicinity were probably sixteen miles long! The beginning of canal irrigation is placed at about A.D. 800. No one knows whether irrigation as practiced by the Hohokam was borrowed from some other region (God knows where) or whether it was independently invented by the Hohokam.

The architectural sequence as worked out by Sayles is superb and understandable. I thank heaven for his clear, simple exposition, and I thank him for setting forth so well his methods and conclusions. The earliest house (Vahki period) was large and square with rounded corners. After this, the house shape was more or less the same for all later periods; but the size of the houses became progressively smaller. All houses of all periods were built in shallow pits, had covered entrance passages, basin-shaped firepits, and wall and roofs of timber and earth. The timbers used were cottonwood or mesquite, both of which grew near the Gila River bed. Sayles was unable to point to any particular area and state that it was the origin of the Hohokam type of house. He shows the

similarities and differences between the Hohokam houses and those from the Anasazi, Mogollon, and Plains areas.

Sayles also succinctly summarizes the Hohokam method of disposing of the dead (cremation for the most part) and gives excellent descriptions and complete typological sequences of their stone artifacts—bowls, chipped and polished implements, palettes, and ornaments. I was amazed and could not help but applaud the great versatility in stone-working of these Hohokam Indians. In addition to the mine-run sort of thing that archaeologists generally find, Sayles illustrates the most beautiful stone objects, which are far more interesting and complex than anything I have ever seen from North America. These objects are truly magnificent.

The section on pottery is more than adequately treated by Haury. As Gladwin points out in an introductory paragraph to this chapter, no published description of pottery without adequate illustrations is worth a tinker's damn. This ideal is adhered to with the result that the reader has abundant, visual examples of all types of Snaketown pottery. The sequence of types was worked out from the controlled digging of the refuse mounds. Two important (to me) facts emerge from this chapter: one is the proof that Hohokam pottery is earlier than any Anasazi pottery; and second, that the method of cross-dating is ingenious and acceptable. Fortunately, intrusive pottery both from the Pueblo area to the north and from the Mogollon area to the east was found. These intrusive types had been dated on the basis of tree-rings. Unfortunately, there is no method (at present) by which the earlier phases at Snaketown can be dated, because no datable wood was recovered. An estimated chronology, which allows a conservative although arbitrary span of two hundred years per phase, would date the earliest period (Vahki) at Snaketown at 300–100 B.C. A great deal of howling and grousing at this chronology have been indulged in by some archaeologists who love to snipe at petty things instead of realizing the worth of this admirable publication. This chronology, as set up, is perfectly acceptable to me because it is clearly set forth as "*estimated*" in other words, "not fixed"; and because certainly the men who carried on the digging and made the analyses have a better right to make such guesses and are probably more nearly correct than any outsiders would be. Let him who would challenge this chronology first study intensely every sentence of this report; or better yet, visit Gila Pueblo, see the materials, go over the data, talk to the staff; then let him criticize and amend, if he so desires.

My feeling of accord with this chronology carries over into the conclusions where Gladwin sets forth more explicit and, to me, very reasonable and logical deductions concerning the Snaketown phases and their duration.

A concise and very clear description of the various special and general traits of each phase is also included. If the reader becomes bogged in details in the earlier chapters, all he need do, to keep the record straight, is to read pages 250 to 267 where all the Snaketown periods are summarized.

I can not agree with Gladwin's notion that the only explanation for the

large refuse mounds " . . . is that the Hohokam were inspired by the same impulse as that which was responsible for the building of the mounds in the Mississippi Valley, in other words, the intentional raising of a mound." It seems to me that he misses a good bet when he disposes of these refuse mounds in this fashion. First, he unconsciously admits a Mexican influence (which he is anxious to avoid); and second, he should argue, (I think) that so many large rubbish heaps came about because Snaketown was occupied a very long time by a few people or for a comparatively short time by a large population.

Mention should be made of the excellent analyses of perishable materials by Sayles, assisted by Dorothea S. Kelly; of the chapter on the petrography of some of the Snaketown pottery[205] by Nora Gladwin (in which Miss Gladwin shows that the Mogollon pottery was intrusive in Snaketown from the Mogollon area); of the definition of types of figurines by Haury; of the metallurgy of Arizona by W. D. Root; and the analyses of the structure of Snaketown copper bells, by B. H. McLeod. Many paragraphs should be devoted to these briefly-mentioned portions, but unfortunately, lack of space makes this impossible.

I am grateful for this capable, painstaking, and well-organized report. It is tops; it is exciting; it is far above most other footling, sterile archaeological publications; and it is fearless.

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VOLUME II—COMPARISONS AND THEORIES

This volume is all Mr. Gladwin's. In it he reviews the broader problems of New World archaeology, criticizing theories about the origins and development of aboriginal American cultures held rather generally by American archaeologists, alleging with considerable justification that some of these theories have become dogma without evidence to support them and that the dogmas obstruct other interpretations more in accord with the evidence at hand. Gladwin sportingly offers "heretical theories" of his own which he feels better accord with the evidence than the "dogmas," though he expects general opposition to his interpretations. He invites a friendly discussion of and disagreement with his presentation by promising to prove all his heresies true some day—unless he changes his mind. Some of his interpretations may well turn out to be accurate, others appear to have practically no chance of surviving. At any rate Mr. Gladwin's essay should stimulate a rigid re-examination of all our evidence regarding American prehistory and a careful evaluating of the assumptions on which are based the interpretations of that evidence. Various workers have begun to question some of the generally accepted interpretations in recent years; Mr. Gladwin's bold departure from the safety of numbers gives the rest of us a chance to question the old familiar interpretations in the light of definite alter-

[205] No mention is made of the number of sherds which were microscopically examined, although I should think it would be important to do so.

natives. This is a condition essential to the accurate evaluation of any theory and we should all be grateful to Mr. Gladwin for the opportunity he has given us to examine the old in the light of his new interpretations, and to be equally critical of each.

Mr. Gladwin confesses to a strong dislike for loose ends which impels him to attempt interpretations which exhaust the evidence and sometimes, to my more pedestrian way of thinking, go clean beyond the evidence into the realm of guesses. One of these is his summation of the evidence for the migration of various physical types into the New World. Using mainly Hooton and Dixon as his sources, Gladwin postulates four main migrations into the Americas: first, the "Southern long-heads" (Australoid), second, the "Northern long-heads" (Negroid); third, the "Cordilleran broad-heads" (Mongoloid); and fourth, the "Athapascan broad-heads" (" . . . in some respects distinguishable from the Cordilleran"). It is generally postulated that the first comers to the Americas were long-headed, later arrivals broad-headed. But there is no evidence to support the view that any *population* in the New World was ever Australoid or Negroid in the sense that whole populations had physical characteristics similar to these types or, even less, that pseudo-Australoid or pseudo-Negroid individuals were genetically related to the groups after which they have been, perhaps ill-advisedly, named. Actually, the various types Gladwin mentions, to each of which he attributes a limited and exclusive geographical range, can be produced archaeologically and ethnologically in equal purity of type from many areas in the New World as components in various total populations. Not enough evidence is in yet to decide what were the distinguishable elements in the aboriginal population of the Americas nor the order of their coming. What evidence there is suggests that the incoming populations were racial mixtures before they crossed Bering Straits.

Mr. Gladwin also seems rather uncritical in his treatment of aboriginal languages. He starts by accepting Sapir's proposed grouping of many North American Indian languages into six families (which has not yet been generally accepted by linguists). He further simplifies Sapir's simplification by retracting "recent movements," removing the Athapascan Navajo and Apache from the Southwest, and placing them in the northwestern Athapascan area; retracting the Siouan peoples from the Plains, the Iroquois from New York and placing both in the Southeastern Hokan area, etc. Having recognized and retracted these "recent" though prehistoric movements and further simplified the language boundaries to make each family appear, insofar as possible, to have occupied a solid block of territory, Gladwin then makes the startling assumption that each of these areas was occupied for thousands of years by people speaking languages of the same families as were spoken in the areas in historic times. Thus he is able to visualize the Hokan-speaking peoples as the first comers to America, the Algonkians as "stratified on top of the Hokan people," (p. 60) then the Aztec-Tanoans who were held to the Rocky Mountain region by the populations already settled to the east, and finally the Athapascans who pushed

into the Northwest. Interestingly, Gladwin does not say anything about the language of his Cordilleran peoples, presumably because the people in each of the areas of high culture in the America spoke a language unrelated to those spoken in all the other areas of high culture.

Gladwin goes on to claim that the distribution of Sapir's Hokan family (after Gladwin's retractions) " . . . conforms remarkably well to the distribution of Southern long-heads" (p. 69). This is simply not true; many of Gladwin's Southern long-heads ("Australoids") have been found in South America where no member of the Hokan language is known, the type was described (as "pseudo-Australoid") by Hooton from Pecos skeletons, also outside the historic Hokan area, and Gladwin's map shows only a few Southern long-heads in Texas, at the extreme west border of the Hokan stronghold of historic times, none in the body of this language area east of the Mississippi river. Even if the "correlation" did exist, little significance could be attached to the coincidence, for Gladwin postulates a date of 20,000–80,000 years ago for the immigration of this physical type whereas the language is known only from historic times when its speakers were predominantly brachycephalic. He also postulates that these Southern long-heads were the makers of the Durst silt artifacts found near Abilene, Texas, and of the later Abilene and Edwards Plateau cultures of the same general area, although no skeletal material has been found in these horizons. This may turn out to be a good guess—at least the long-headed part, if only Gladwin would not try to connect these people, genetically and culturally, with the Australians. Incidentally, Gladwin seems to accept Leighton's date of Sangamon interglacial for the Durst silt artifacts (p. 24). If he does, he goes counter to the opinion of most glacial geologists who regard that dating as hasty and unwarranted in view of the almost total lack of knowledge of what was happening in Texas in Pleistocene times. These deposits may well be postglacial and it should not be assumed they precede the last glaciation until there is some evidence to that effect.

Gladwin postulates that his Northern long-heads (Hooton's "pseudo-Negroid" type at Pecos) brought the Folsom culture and arrived long after the Southern long-heads had settled across southern United States. This second migration is supposed to have occurred about 15,000–10,000 B.C. (p. 115). Gladwin's reasons for putting it later than the "Southern Complex" are (1) he accepts Leighton's questionable dating for the Durst materials, (2) he feels the Folsom industry is stratified north of the "Southern Complex," (3) Abilene and early Edwards Plateau materials show no Folsom influence, whereas Gladwin thinks he sees Folsom influence on later Edwards Plateau materials in the base notched projectile points that appeared in the latter culture. This seems like a very doubtful piece of evidence on which to base a chronology. On p. 37 Gladwin says: "No transitional stages have been found or suggested which could explain Folsom or Yuma as having evolved out of either Abilene or Edwards Plateau." This may be evidence that Folsom was earlier than either.

The question of chronology here must be left open, it seems to me, until some evidence on which to base an opinion comes to light.

Regarding his Northern long-heads, Gladwin goes on to make a sweeping and rather breath-taking statement to the effect that the modern Algonkin speaking tribes, the Folsom culture and this allegedly Negroid physical type show a "surprisingly close correlation" in distribution (p. 70) and continues by saying that unless evidence to the contrary exists, " . . . we may be justified in advancing the idea that the Northern long-headed physical type and the Folsom Culture may, at one time, have been the attributes of the ancestors of the modern Algonkin tribes." The author's own map (facing p. 70) does not bear him out. All the true Folsom finds are in an area he indicates was populated mainly by Southern long-heads. As far as language is concerned, five of the seven finds of true Folsom points are in the Aztec-Tanoan area, only two in that part of the Plains area which he includes in his "retracted Algonkin" but which may have been Aztec-Tanoan before the Siouan speaking peoples moved into the high plains, rather than Algonkin as Gladwin assumes on no evidence at all. Only a little over half the Folsom-like points (which may not be related to the true Folsom) are in the Algonkin area of Northern long-heads, the other half are in the Hokan and Aztec-Tanoan (presumably Hokan before the Aztec-Tanoans came) areas of Southern long-heads. Again, in calling attention to this "correlation," Gladwin ignores the 10,000 year time gap he has established between Folsom points and modern Algonkin speakers.

Later in the book, in an effort to show some tie between the Hohokam and the modern Pima, Mr. Gladwin says that between 700–1200 A.D. Aztec-Tanoan peoples were moving south and that under their influence the Hohokam changed language from " . . . a Hokan tongue, not improbably a variety of Keresan, to the Aztec-Tanoan Piman language which is still spoken" (p. 120). Aside from the fact that there is no evidence at all for this statement, it leaves one wondering how the author can justify his former assumptions that Algonkin and Hokan speaking peoples stayed put for thousands of years as Northern and Southern long-heads, respectively. One is still further confused on this point when, on page 124, Gladwin alleges that in the Mississippi Valley and the Southwest the population changed from long to broad headed although in the former place there was no " . . . apparent change in language which remained either Algonkin or Hokan," while in the latter region " . . . the Hokan language remained unchanged." By making such exceptions to fit the exigencies of particular cases Gladwin by his own hand destroys all possibility of our accepting any of his sweeping physical type-culture-language "correlations."

Gladwin suggests that the makers of the Folsom points may have been the authors of the Woodland culture, overlooking the fact that Folsom points have never been found in a Woodland site nor anywhere else east of the High Plains. The so-called Folsom-like points which have been found in various regions east of the Mississippi are surface or unidentified finds without time implications.

The author makes a better point when he suggests that Woodland pottery may be derived from a different tradition than other New World pottery as suggested by differences in paste, surface finish, decoration and shape. W. C. McKern has also made this tentative suggestion, and the idea seems to be palatable to several other Middle Western archaeologists. Woodland pottery exists in many northern areas where there never was any agriculture. It seems to occupy a solid area in the northeast and possibly to extend toward Alaska. Apache and Navajo pottery looks something like it both in shape and quality —and these groups may have come from the northwestern area in late prehistoric times. Sherds similar to Woodland wares have come out of Siberia where there never was an agriculture. There thus seems to be some slight evidence for Gladwin's "Northern Complex" minus the "Negroid" physical type and minus the specific association with Algonkin or Athapascan languages; minus also the Folsom industry which has never been found associated with Woodland materials—Woodland cultures had their own characteristic stonework which shows no relationship to Folsom.

With the Northern and Southern Complexes *in situ* and functioning, Mr. Gladwin envisages the northerners sticking to a meat diet, the southerners beginning to turn to the various food plants and coming to depend increasingly on them as indicated by the finding of seed grinding equipment in levels he considers to be very early; early enough so that he feels able to postulate that such implements appeared in America before they did in Europe (p. 33). This postulated early seed-gathering stage launches the author into two lines of argument both of which seem eminently sound to me.

One is against a tendency observable in several American archaeologists to try to type early American artifacts by calling them after alleged European prototypes. Gladwin boldly plumps for an American palaeolithic which pursued a course independent of the sequence in Europe and in which both the technique of grinding tools and the knowledge of flint knapping were in advance of Europe of the time. We pedestrians may pause a little before postulating this priority on the still very doubtful dating of the Abilene, Oso and Edwards Plateau cultures, but at least we should agree, I think, with Gladwin when he says: " . . . the disconnected links of evidence [in the New World] should not be dismissed simply because they do not conform to what we know of the cultures of Europe" (p. 34).

Gladwin's other argument at this point, with which I also agree, is that it's high time we gave up the assumption that agriculture, or the idea of agriculture, originated only once in the New World. There is not a speck of evidence for this assumption. It seems perfectly possible, even likely, to me as to Gladwin, that various plants may have been domesticated independently at various times and in various places in the Western Hemisphere, and by people who had never heard of agriculture from anyone else.

At any rate, with agriculture being practiced in various places by peoples like the Ozark and Texas cave dwellers and in Utah, Gladwin introduces one

of his most startling theories, that the high cultures of the Mississippi Valley, the Southwest, Mexico, Central and South America were brought into the New World from Asia by a fast-moving group of brachycephals whom he calls the "Cordilleran broad-heads." Gladwin lists eleven culture traits which he says are associated with this physical type (p. 88). He dates the arrival of these people at about 500 B.C. and says they left traces of their physical type and culture in the Mississippi Valley and " . . . amongst the people who later were known as the Caddo, Wichita, Mogollon, and Hohokam . . . [then] following the east coast of Mexico through Tamaulipas and Vera Cruz, some groups worked up to the Valley of Mexico and Jalisco, others, moving still farther south, reached Central America and the west coast of South America" (p. 89).

We can eliminate the Mississippi Valley at once from having been directly affected by the Cordillerans for the Lower Mississippi cultures probably do not antedate 1000 A.D. and may be even later. They are thus far too late to have been affected by the hypothetical Cordilleran people. Certainly there are similarities between these cultures and Middle America. Some of the materials look positively Valley of Mexico-ish, perhaps even Aztec. To suggest openly that the Lower Mississippi cultures were directly derived from the Valley of Mexico when the latter culture was at its peak (á la Mrs. Nuttall) would be radical enough since to do so one must rely on boats or forced marches inasmuch as few or no Valley of Mexico materials have been found between there and the lower Mississippi region. It is creating unnecessary difficulties to call in strangers from Asia who arrived 1500 years too soon without visible means of support or transport. The Mexicans *could* have carried enough food for the trip on their backs; the Asiatics should at least have brought pack animals.

In general, one can point out regarding this "Cordilleran Complex" that only a couple of the traits listed were known anywhere in the New World before 100 A.D. Things like pottery vessels on legs, ball-courts, mosaic plaques, metal-working, etc., appeared in the Hohokam area after 500 A.D., though they were known in Middle America considerably earlier, thus making a south to north spread of knowledge of these things more likely than a north to south. Some of the traits never appeared in South America, some appeared only in Middle America and the Southwest, others only in Middle America and the Mississippi Valley, etc., etc. Once again Gladwin manufactures a complex by assuming that all the brachycephalic people were related (only those possessed of complex culture) and came together to the New World and by ignoring known time differences in the acquisition of the various traits listed in the various regions. It is significant, too, that for this latest migration, Gladwin can name no language. Certainly if the Algonkins retained their language and location for 10,000 years it would not be too much to ask that the Cordillerans should have maintained theirs along with their complex culture for 2,000 years.

In attempting to defend his "Cordilleran Complex," Gladwin says:

" . . . the basic similarities which have been recognized between the Valley of Mexico and the Hohokam were due to derivation from a common Cordilleran

source rather than to direct diffusion between the Southwest and Mexico. Such direct diffusion is denied by lack of evidence in both Sonora and Chihuahua, where we should have been able to find some traces had such contact ever been established" (p. 89).

The author might have added that the west coast of Mexico is virtually unexplored, archaeologically, the east coast only scantily, the interior not sufficiently to justify definite conclusions. His argument, and the further facts I have pointed out, do not help his Cordilleran theory a bit, however, for this lack of evidence of a northward stream of cultural influence is equally blank regarding the southward movement of the hypothetical Cordillerans. I suspect Gladwin would seek to avoid this thrust by saying the Cordilleran people moved south in long purposeful strides and hence left little or no trace of their passing except where they tarried by the way with agricultural precursors. But the proponent of influence moving north from Middle America could still get the better of it by countering that the high cultures to the south sent trading or exploring expeditions to the north and by pointing out that such parties would leave even fewer traces of their passing than would the migration of a whole people. Moreover, Gladwin has the apparently crushing difficulties of showing, first, where in Asia there was a cultural complex and a physical type from which the Cordilleran peoples could have migrated to the New World, and second of showing some trace of their passage over the long route from somewhere in Asia to the Southwest. This Asiatic complex must be a cultural assemblage in one place at one time, must resemble the derivative cultures at least as much as Middle America resembles the Southwest—all this is necessary to fit Gladwin's idea of a rapid purposeful migration. He cannot win his case by picking individual traits, separated from one another by thousands of miles in the East. Moreover, the complex must be of the proper age, it will not do to point to ethnological parallels as Gladwin does. He asks with a gentle jeer (p. 125) where the American Garden of Eden is in which the high cultures of the New World originated. One must admit at once that we can not point with reasonable assurance to any one fountainhead from which it can be demonstrated that all the high cultures derived. But we are not entirely at a loss as Mr. Gladwin is if in turn we ask him, "Where is the Garden of Eden for the Cordilleran Complex?" This misty region seems as well lost as Atlantis.

Incidentally, it seems to me that Mr. Gladwin attributes modern knowledge of geography and meteorology to his Cordillerans of 2000 years ago. How else would they know that they could hurry north into a sub-Arctic climate, cross Bering Straits and hurry back southward to find a climate where their arts could flourish? (See p. 129.)

Now for the Hohokam. Mr. Gladwin bases a lot of his interpretation of general problems of New World archaeology on his dating of the beginnings of the Vahki phase at 300 B.C. (Pp. 10–11. Elsewhere he retreats to 100 B.C.) While this dating may eventually turn out to be accurate, it seems too doubtful at the present time to bear the weight Mr. Gladwin puts on it. If the Hohokam

got their characteristic culture from the hypothetical Cordilleran peoples, as Gladwin claims they did, the whole development demonstrated by Gila Pueblo's able excavations might have occurred in a comparatively short time. To go to the opposite extreme from Mr. Gladwin's interpretation for a moment, the Vahki phase might have started as late as 400–500 A.D. under these circumstances. If the Hohokam development was more or less autochthonous, with the occasional introduction of a new idea from local inventors or from other cultures, the development of Hohokam culture might have taken a good deal longer, even longer, perhaps, than Gladwin postulates. But in that case, his Cordilleran people vanish into the mythological mist from which they never wholly emerge at best. In the present state of our knowledge of Hohokam dates it seems to me we should learn more than Mr. Gladwin has from the recent dating developments in the Anasazi area, the Valley of Mexico, the Maya and Inca areas. On evidence at least as good as we now have for Hohokam dating, all these were once thought to extend into B.C. times. The moral seems obvious —until by cross-dating or other reliable means of establishing absolute or relative dating for the Hohokam it is shown to be earlier than these other cultures, the conservative interpretation would be to date the beginnings of Vahki as no earlier than cultures of comparable complexity in the other areas mentioned. The presence of excellent polished red pottery intrusive in the earliest levels of the Hohokam also suggests the wisdom of caution in dating the latter. This pottery is thought to be of Mogollon origin, and so far there is no hint of a culture in the Mogollon area capable of supplying such a ware even as early as 500 A.D. Mr. Gladwin mentions this difficulty on page 14 but does not dispose of it.

Gladwin shows that the Anasazi cultures in Pueblo II and III times were apparently borrowing ideas from the Hohokam, that there is no evidence to show that the latter borrowed from the former, and he says:

> As new tree-ring dates are published, it becomes increasingly difficult to explain the rapidity of cultural evolution amongst the Anasazi unless we admit that they were borrowing ideas from a civilized source which had already reached a point where it was capable of contributing such ideas. If our estimates of time are approximately correct, the culture . . . of the Hohokam could have fulfilled such a requirement (p. 13).

But if Gila Pueblo's estimates are wrong by a few hundred years, if it turns out that Hohokam culture actually developed as rapidly as Anasazi, then the interpretation most in accord with the evidence will be that Snaketown was the last link in a chain of influence extending from some southern "civilized source" to the Southwest. It is this possibility, at the moment an even chance it seems to me, that makes me hesitate to accept the seemingly quite reasonable dating of the early Hohokam phases.

Mr. Gladwin concludes with a chapter called "The New World and the Old" in which he lists the traits he alleges to characterize his Northern, Southern and Cordilleran "Complexes" side by side with "Some Old World Analogies." This is by far the weakest part of the book and contains too many glaring

errors to be reviewed in detail. The last three of eighteen traits alleged for the Southern Complex will serve as an example. Gladwin lists:

Fire dance in which the dancers' bodies are daubed with white clay.	
Modern Navajo, E. [Ethnological]	Australia, E.
Totemism.	
California, E.	Australia, E.
	Melanesia, E.
Initiation ceremonies.	
North and South America, with emphasis in California	Australia, E.
	Melanesia, E.
Australoid physical type.	

The first of these is very indefinite but taken as Gladwin describes it, such a dance is practiced by the Andamanese, in various parts of Africa, all over the New World and probably in various other places. Totemism is even worse; in one form or another its distribution is world-wide and it is, or has been, practiced by people of every known racial type and mixture. Even the "Cordilleran" Aztecs and Incas practiced certain features of totemism. Initiation ceremonies are, if possible, even worse than totemism. Practically every aboriginal people in the world had ceremonies by which the young were inducted into the society as fully participating members which is I suppose what Gladwin means by the phrase. Even we moderns have plenty of such ceremonies—who hasn't heard a convocation orator harangue about the meaning of "commencement"? To list such items as the above and then tag on "Australoid physical type," implying that only such peoples carried on the activities mentioned is simply fantastic. The other listings contain comparable misstatements of fact. The omission of this whole chapter would have strengthened the book.

Mr. Gladwin strikes a valuable blow against archaeological dogmatism in this book. But there are a few points on which Mr. Gladwin is himself dogmatic. One is his assertion that "Australoid" or "Negroid" peoples, with whom he mistakenly peoples America in early times, would have been incapable of "inventing the traits which were the very foundations of civilization" (p. 123). For proof he points to Australia and Melanesia where dwell "possible relatives" of the New World long-heads. This viewpoint is patently erroneous inasmuch as the civilizations of Egypt and the Near East were largely built by peoples a lot more Negroid than any population so far discovered in the New World. Our ancestors were far behind the Negroidish pre-dynastic Egyptians for many hundred years and got their start in civilization from the growth initiated by the latter.

Mr. Gladwin tends to oppose directly those who would derive all American culture from Mexico or Central America by denying that anything spread from there to other regions. There is no more reason to this dogma than to the one he opposes. As I see it, the problem need not be posed in "all or none" terms. Some elements of culture, such as agriculture, may have originated in various places

in both the Old and New Worlds at various times. Woodland pottery may have been brought by hunting peoples from Asia, and in addition, pottery may have been invented once or several times in America—perhaps one of these inventions occurred in the Cochise area where there seems to be a very old pottery horizon. Human effigy statuettes, ball-courts, pyramidal mounds, etc., may have originated in various of the high cultures of Middle America at different times and places and have been carried by some means as yet undetected, also at various times and by various routes, some to the Hohokam, some to the lower Mississippi Valley. Some knowledge may well have been brought from Asia at a comparatively late time by one or more prehistoric Marco Polos. The story of cultural growth in America, if it is ever deciphered, will probably not be a simple family tree in diagram, with all elements coming from any one "Garden of Eden," but a complex interlacing of various cultural streams merging and diverging in time and space like a tangle of yarn, with knots here and there where many streams intermixed to produce the peak developments.

Mr. Gladwin also suffers from an apparently uncontrollable urge to accept the earliest possible dates for cultural remains which interest him, though he readily accepts late dating for those which do not. Thus he puts Durst silt materials, Abilene and Edwards Plateau, Caddo, Wichita, Lower Mississippi, Mogollon and Hohokam beginnings as early as he possibly can while accepting, for instance, Vaillant's "latest possible" dating for Valley of Mexico beginnings on a basis of equality with these other "earliest possible" dates. He should readjust one or the other set, either pull all his own up so they make no more demands on our credulity than Vaillant's do, or else add a few centuries to the age estimated for regions from the Valley of Mexico south.

All in all, however, Mr. Gladwin grinds his axe no more vigorously than have many others before him ground other axes. He preaches against overshooting the mark, not by a model of moderation, but by equally overshooting in an opposite direction. Perhaps there is more method than madness in his attack —certainly his work demands attention as it might not if it were more moderate in its claims. And in their flurry to refute Mr. Gladwin's points, many workers may well find themselves retreating from untenable positions of their own. I hope Mr. Gladwin will supplement this volume with others as his fertile mind works out other possible interpretations of American archaeology.

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SOME RECENT PUBLICATIONS

UPPER NORTH AMERICA

Ariss, Robert, Material Culture Notes, Distribution of Smoking Pipes in the Pueblo Area. New Mexico Anthropologist 3, Nos. 3, 4: 53–57, Albuquerque: University of New Mexico, January-April, 1939.

Bailey, John H., A Ground Slate Producing Site Near Vergennes, Vermont. Champlain Valley Archaeological Society Bulletin 1, No. 2, Fort Ticonderoga, New York, June, 1939.

Basto, Arthur, The Second Summer's Field Work on the Village Site in South Woodstock, Connecticut. Connecticut Archaeological Society Bulletin 8: 27–44, May, 1939.

Bibliography of Southwestern Archaeology January, 1938—April, 1939. New Mexico Anthropologist 3, Nos. 3, 4: 44–48, Albuquerque: University of New Mexico, January–April, 1939.

Brew, J. O., Appendix C: Notes on Excavations at Alkali Ridge, Utah. In: Martin's Modified Basket Maker Sites Ackmen-Lowry Area, pp. 487–492, Chicago: Field Museum, 1939.

Brew, J. O. and John T. Hack, Prehistoric Use of Coal by Indians of Northern Arizona. Plateau 12, No. 1: 8–14, July, 1939.

Colton, Harold S., An Archaeological Survey of Northwestern Arizona, including the Descriptions of Fifteen New Pottery Types. Museum of Northern Arizona Bulletin 16, Flagstaff, 1939.

Colton, Harold S., The Date of Three Turkey House. Tree-Ring Bulletin 5, No. 4, Tucson, 1939.

Delavan, Wayne, Kansas' Archaeological Survey. Wisconsin Archeologist, N.S., Vol. 20, No. 1: 9–13, Milwaukee: Wisconsin Archeological Society, July, 1939.

Deuel, Thorne, Lower Mississippi Traits in the Middle Phase in Illinois. Illinois State Academy of Science Transactions 31, No. 2: 68–70, December, 1938.

Ely, Albert Grim, Field Work at Pecos. In El Palacio 46, No. 6: 124–126, June, 1939.

Funkhouser, W. D. and W. S. Webb, The Chilton Site in Henry County Kentucky. Department of Anthropology and Archaeology, University of Kentucky Publications 3, No. 5: 173–206, July, 1937.

Funkhouser, W. D., A Study of the Physical Anthropology and Pathology of the Osteological Material from the Wheeler Basin. In: Bureau of American Ethnology Bulletin 122: 109–125, Washington, 1939.

Gaumer, Alfred Elliott, A Freemont River Culture Cradle. Masterkey 13, No. 4: 139–140, July, 1939.

Getty, Harry T., Appendix D: Report of dates from Sites 1 and 2, Southwestern Colorado. In: Martin's Modified Basket Maker Sites Ackmen-Lowry Area, pp. 493–495, Chicago: Field Museum, 1939.

Goggin, John M., A Ceramic Sequence in South Florida. New Mexico Anthropologist 3, Nos. 3, 4: 35–40, January–April, 1939.

Greenman, Emerson F., Cultural Relationships of Archaeological Sites in the Upper Great Lakes Region. Reprinted from Michigan Academy of Science, Arts and Letters, Papers 24, Part IV, 1939.

Griffin, James B., Report on the Ceramics of Wheeler Basin. In: Bureau of American Ethnology Bulletin 122: 127–165, Washington, 1939.

Harrington, M. R., Trailing Early Californians. The Masterkey 13, No. 5: 163–166, September, 1939.

Heizer, Robert F. and Franklin Fenenga, Archaeological Horizons in Central California. American Anthropologist N.S., Vol. 41, No. 3: 378–399, July–September, 1939.

Jones, Walter B., Geology of the Tennessee Valley Region of Alabama, with Notes on the Topographic Features of the Area and the Effect of Geology and Topography upon Aboriginal Occupation. In: Bureau of American Ethnology Bulletin 122: 9–107, Washington, 1939.

Kienietz, Vernon & Erminie W. Voeglin, ed., Shawnese Traditions; C. C. Trowbridge's Account. Occasional Contributions from the Museum of Anthropology, University of Michigan, No. 9, Ann Arbor, University of Michigan Press, June, 1939.

Lyon, Charles J., Objectives and Methods in New England Tree-Ring Studies. Tree-Ring Bulletin 5, No. 4, April, 1939.

McKern, W. C., Wisconsin Archeology in the Light of Recent Finds in Other Areas. Wisconsin Archeologist, N.S., Vol. 20, No. 1: 1–5, Milwaukee: Wisconsin Archeological Society, July, 1939.

Martin, Paul S., Modified Basket Maker Sites Ackmen-Lowry Area, Southwestern Colorado 1938. Anthropological Series, Field Museum of Natural History 23, No. 3: 307–499, Chicago: Field Museum, 1939.

Opler, Marvin K., Southern Ute Pottery Types. The Masterkey 13, No. 5: 161–163, September, 1939.

Peithman, Irvin, Evidences of Early Woodland Culture at Chalk Bluff Rock Shelter. Illinois State Academy of Science, Transactions 31, No. 2: 74–76, December, 1938.

Reichard, Glady A., Dezba; Woman of the Desert. 161 pp., plates, New York: J. J. Augustin, 1939.

Ritter, Woldemar H., Archaeology for the Amateur, Written Especially for the Boy Scouts of South Carolina. 9 pp., Charleston Museum, June, 1939.

Rouse, Irving, Some Suggestions as to Historical Perspective in Connecticut Archeology. Connecticut Archaeological. Society Bulletin 8: 5–25, May, 1939.

Smith, G. Hubert, Excavating the Site of Old Fort Ridgley. Reprinted from Minnesota History, Minnesota Historical Society, St. Paul, 1939.

Smith, Gerald A., Circular Pits of Summit Valley, California. The Masterkey 13, No. 5: 169–171, September, 1939.

Stallings, W. C., Dating Prehistoric Ruins by Tree Rings. General Series, Laboratory of Anthropology, Bulletin 8, 1939.

Thomas, C. Joe, Bluff Shelters of Union County. Illinois State Academy of Science, Transactions 31, No. 2: 77–78, December, 1938.

Thompson, Arthur R., The Identity of the Red Paint People. Connecticut Archaeological Society Bulletin 8: 3–4, May, 1939.

Tichy, M. F., The Archaeology of Puaray. El Palacio 46, No. 7: 145–163, June, 1939.

Webb, Wm. S., An Archaeological Survey of Wheeler Basin on the Tennessee River in Northern Alabama. Bureau of American Ethnology Bulletin 122: xv, 214 pp., 122 plates, 25 figures, 2 maps, Washington, 1939.

Webb, Wm. S. and W. G. Haag, The Chiggerville Site, Site 1, Ohio County, Kentucky. Department of Anthropology and Archaeology, University of Kentucky Publications 4, No. 1: 62 pp., 23 figures, map, March, 1939.

Weer, Paul, Preliminary Notes on the Muskhogean Family. Prehistory Research Series, Indiana Historical Society, Vol. 1, No. 7, August, 1939.

Whiting, Alfred F., Ethnobotany of the Hopi. Museum of Northern Arizona, Bulletin 15, Flagstaff, 1939.

Wray, Donald E., Hopewell Traits in Certain Bluff Mounds of Fulton County. Illinois State Academy of Science, Transactions 31, No. 2: 81–82, December, 1938.

MIDDLE AMERICA

Linné, S., Blow-guns in Ancient Mexico. Ethnos 4, No. 2: 56–61, Stockholm: Ethnographical Museum of Sweden, April–June, 1939.

EARLY MAN

Wormington, H. M., Ancient Man in North America. Colorado Museum of Natural History, Popular Series No. 4, May 1, 1939.

GENERAL

Amsden, Charles, Indians at the Golden Gate International Exposition. The Masterkey 13, No. 5: 167–169, September, 1939.

Coon, C. S., The Races of Europe. xv, 739 pp., 46 plates, 16 maps, figures, New York, Macmillan, 1939.

Delavan, Wayne, What Will Become of Your Collection? Wisconsin Archeologist, N.S., Vol. 20, No. 1: 6–8, Milwaukee: Wisconsin Archeological Society, July, 1939.

Fosberg, F. R., Plant Collecting Manual for Field Anthropologists. 22 pp., Philadelphia, 1939.

Hall, E. T., Jr., A Method for Obtaining a Plane Surface on Charcoal. Tree-Ring Bulletin 5, No. 4, Tucson, April, 1939.

Harris, Charles, The Making of an Arrowhead. Illinois State Academy of Science, Transactions 31, No. 2: 71–73, December, 1938.

Hurt, Wesley, Jr., A Method for Cataloging Pictographs. New Mexico Anthropologist 3, Nos. 3, 4: 40–44, January–April, 1939.

Oglesby, Catharine, Modern Primitive Arts, of Mexico, Guatemala and the Southwest. 226 pp., McGraw-Hill, 1939.

SOUTH AMERICA

Hewett, Edgar Lee, Ancient Andean Life. 366 pp., Bobbs-Merril, 1939.

Mason, J. Alden, Archaeology of Santa Marta Colombia; the Tairona Culture, Part II, Section 2, Objects of Pottery. Anthropological Series, Field Museum of Natural History 20, No. 3: 275–418, Chicago: Field Museum, 1939.

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